

6.12 NOISE

Introduction

This section presents an evaluation of sound levels associated with the Project at the Morro Bay Power Plant (MBPP). The MBPP is an existing industrial facility that has been in operation since the 1950s. The MBPP is located on U.S. Highway 1, about 12 miles north of the City of San Luis Obispo, California in San Luis Obispo County (County). The plant is situated in the City of Morro Bay, near the commercial/tourist Embarcadero area. The area around and near the MBPP site includes commercial business, recreational and residential land uses.

Sound levels from MBPP have declined over the last 25 years. The reductions are the result of technology upgrades as power generating equipment has been retrofitted, the most recent upgrades occurring in the last 10 years. The Project will result in even further reduction in noise levels in the surrounding community. This is because the older power generating units, Units 1 through 4, which are being replaced as part of the Project, are louder than the new, quieter state-of-the-art combined cycle units which will replace them. Combined-cycle technology is the industry standard for power generation in the United States. Duke Energy has worked closely with Duke/Fluor Daniel to incorporate numerous design features into the Project that dramatically reduce noise levels around the City of Morro Bay by up to 20 decibels (dB) in some locations.

As a result of the Project, there will be an increase in power generation capacity and efficiency at MBPP with less environmental impacts, including notably, reduced sound levels in the Morro Bay community from the MBPP. For these reasons, the sound levels resulting from implementation of the Project will be less than significant.

Overview Summary

Duke Energy has paid considerable attention to noise issues associated with the Project based on concerns that have been raised by City of Morro Bay residents and local officials. Extensive noise modeling has been performed for predicting the noise emissions as part of the long-term operation of the plant once construction has been completed. Further, detailed analyses have been performed for each of the three distinct stages of Project construction⁽¹⁾. The results are summarized below.

(1) Stage I will be the decommissioning and removal of existing onsite fuel oil tanks from the MBPP site. This stage will last about 3 months. Stage II will be construction of the new power generation units. This stage will last about 21 months. Stage III of the construction activities will be the decommissioning and removal of existing power generation equipment from the MBPP site. This will include removal of the existing power building and, notably, the three 450-foot-tall stacks. Stage III activities will last approximately 4 years.

The onsite tank demolition stage of construction will be short, lasting only 3 months. Analyses show that noise levels for this stage of construction will generally be comparable to existing (ambient) noise levels throughout the City. Occasionally, noise levels louder than the existing noise environment will result from the actual disassembly of the tanks, but since these noises will be of limited duration and will occur during daytime hours only, they are not considered to be significant.

The construction of the new combined-cycle units is the stage that will have the largest intensity of noisy activities occurring onsite. An analysis of the construction noise shows that construction noise will be at or only slightly above (within 4 dB) existing (ambient) noise levels in areas close to the power plant. Construction noise across Highway 1 at the High School, along the Embarcadero, and along the public beach shoreline will be lower than existing (ambient) noise levels. Part of this positive result is due to a decision that was made by Duke Energy (as a result of meetings with the public) to use a special quiet pile driving technique that uses auger cast piles. Noise levels from auger cast piling are substantially lower than the traditional hydraulic ram technique and, importantly, the new technique avoids the annoying repetitive pounding sounds that typify conventional pile driving activities. For all of these reasons, noise levels from Stage II construction activities will not be significant.

Stage III of the construction period is removal of the existing power building and the three 450-foot-tall stacks for Units 1 through 4. This stage will not involve the use of explosives, but will, rather, consist of the gradual and systematic disassembly of the existing power generation facilities. Materials that can be recycled will be salvaged and taken offsite to potential users. The stacks are expected to be cut into sections (starting with the top) and lifted off by a large crane. Noise levels for this stage of construction will be intermittent with occasional high noise levels associated with the cutting and breaking process. Temporary increases in existing daytime noise levels will be experienced at the Embarcadero and along Scott Avenue during this stage, but noise levels will generally be lower than existing (ambient) noise for most of the four-year Stage III construction activities. Impacts from Stage III of the construction period will not be significant.

By far, the best news for noise conditions in Morro Bay is associated with long-term operation of the new MBPP. Noise levels will decline in almost every location around the City. For example, along the Embarcadero, just across from the existing power plant, noise levels will decrease by 20 dB from existing levels of 67 dBA. Most importantly, the Morro Bay Noise Element Standards for sensitive land uses will be met everywhere around the City. Slightly higher than existing noise levels (but still within Noise Element Guidelines) will be experienced in the RV park area across Morro Creek. This increase is due to the fact that the new power generation equipment will be

located closer to the RV park than the existing power plant. It should be noted that special attention was paid to this area by Duke Energy, however, to assure that noise standards will be met. For example, a sound wall will be constructed just above the Fisherman's storage area and a special quiet heat recovery steam generation (HRSG) system design has been approved by Duke Energy. These two key features, together with an extensive list of other noise control devices will be added to the new units to maintain low noise levels in the RV park area and beyond. These features will also reduce noise along the beach, in the Coleman Park area, and at the Morro Bay High School.

With all of these design features, discussed in subsequent sections, MBPP's contribution to community noise levels from the long-term operation of the power plant will:

- Meet the standards for noise set by the City of Morro Bay as well as standards established by the California Energy Commission (Commission).
- Replace loud, 1950s-vintage power plant equipment with a much quieter, modern-technology power generation facility.
- Be a substantial improvement over existing daytime conditions at nearly every location in and around Morro Bay.
- Result in nighttime noise conditions that will be a significant improvement, compared to the present, due to reduced annoyance from fan whine and transformer hum.

To obtain these significant noise improvements, Duke Energy and Duke/Fluor Daniel have created a very quiet power plant including the following noise reduction elements:

- Selecting an effective plant layout for noise control concerns.
- Low-noise main transformers.
- Extensive baffles on the HRSG exhaust ducts.
- A Shroud enclosed around the transition between the GTG exhaust duct and the HRSG inlet.
- Noise control steam system vents, tanks, and piping on the HRSG penthouse.
- Low-noise boiler feedwater pump trains (low-noise motors and noise control blanketing on the pumps).
- Enclosing as much noisy equipment as practical within the turbine buildings.
- Acoustical properties on all GTG and STG turbine building elements (above and beyond a typical industrial building for this climate zone), including acoustical wall panel construction, ventilation silencers, noise control doors, and quiet HVAC equipment.
- Keeping the existing berms as sound barriers.
- Adding a 20-foot sound wall along the northern most boundary of the site area (just above Fisherman's storage area).

6.12.1 EXISTING CONDITIONS

6.12.1.1 Applicable Noise Standards

6.12.1.1.1 General

Loud noise can be annoying and it can have negative health effects. These effects can include sleep disturbance and speech interference. Loud noise can also distract attention and make day-to-day activities more difficult to perform (EPA, 1978). Noise is expressed in decibels (dB) and is typically measured on an A-weighted scale (dBA). The A-weighting has been shown to correlate with human response to sound and is the most common way of presenting community noise assessments (Harris, 1991). As a frame of reference, Table 6.12-1 provides examples of various outdoor and indoor noises and their typical A-weighted noise levels.

Common ways of calculating noise include the equivalent noise level (L_{eq}), and statistical sound levels (such as L_{90} , L_{50} , and L_{10}). Additional ways of calculating noise include the day-night noise level (L_{dn}) and community noise equivalent level (CNEL). These noise metrics as well as other pertinent acoustical terminology are defined in Technical Attachment 6.12-1.

6.12.1.1.2 City of Morro Bay

The City of Morro Bay Noise Element contains information and requirements for performing noise assessments. Specifically, the Noise Element contains a standard which limits the allowable sound level for stationary sources (such as the Project) at sensitive land uses. The standard limits noise levels, measured at the property line of the receiving sensitive land use, are as follows:

	DAYTIME (7 a.m. to 10 p.m.)	NIGHTTIME (10 p.m. to 7 a.m.)
Hourly Leq (dBA)	50	45
Maximum Level (dBA)	70	65
Maximum Level, Impulsive Noise (dBA)	65	60

TABLE 6.12-1

**SOUND LEVELS AND LOUDNESS OF ILLUSTRATIVE NOISES
IN INDOOR AND OUTDOOR ENVIRONMENTS
(A-Scale Weighted Sound Levels)**

dB(A)	OVERALL LEVEL (Sound Pressure Level Approx. 0.0002 Microbar)	COMMUNITY (Outdoor)	HOME OR INDUSTRY	LOUDNESS (Human Judgment of Different Sound Levels)
130	UNCOMFORTABLY LOUD	Mil. Jet Aircraft Take-Off w/After-burner From Aircraft Carrier @ 50 Ft. (130)	Oxygen Torch (121)	120 dB(A) 32 Times as Loud
120 110		Turbo-Fan Aircraft @ Takeoff Power @ 200 Ft. (90)	Riveting Machine (110) Rock-N-Roll Band (108-114)	110 dB(A) 16 Times as Loud
100		Jet-Flyover @ 1,000 Ft. (103) Boeing 707.DC-8 @ 6,080 Ft. Before Landing (106) Bell J-2A Helicopter @ 100 Ft. (100)	---	100 dB(A) 8 Times as Loud
90		Power Mower (96) Boeing 737, DC-9 @ 6,080 Ft. Before Landing (97) Motorcycle @ 25 Ft. (90)	Newspaper Press (97)	90 dB(A) 4 Times as Loud
80	MODERATELY LOUD	Car Wash @ 20 Ft. (89) Prop. Airplane Flyover @ 1,000 Ft. (88) Diesel Truck, 40 MPH @ 50 Ft. (84) Diesel Train, 45 MPH @ 100 Ft. (83)	Food Blender (88) Milling Machine (85) Garbage Disposal (80)	80 dB(A) 2 Times as Loud
70		High Urban Ambient Sound (80) Passenger Car, 65 MPH @ 25 Ft. (77) Freeway @ 50 Ft. From Pavement Edge, 10:00 AM (76 + or - 6)	Living Room Music (76) TV-Audio, Vacuum Cleaner	70 dB(A)
60		Air Conditioning Unit @ 100 Ft. (60)	Cash Register @ 10 Ft. (65-70) Electric Typewriter @ 10 Ft. (64) Dishwasher (Rinse) @ 10 Ft. (60) Conversation (60)	60 dB(A) 1/2 as Loud
50		Large-Transformers @ 100 Ft. (50)	---	50 dB(A) 1/4 as Loud
40	QUIET	Bird Calls (44) Lower Limit Urban Ambient Sound (40)	---	40 dB(A) 1/8 as Loud
		(dB[A] Scale Interrupted)	---	---
10		---	---	---
	THRESHOLD OF HEARING			

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Source: MGA,1991

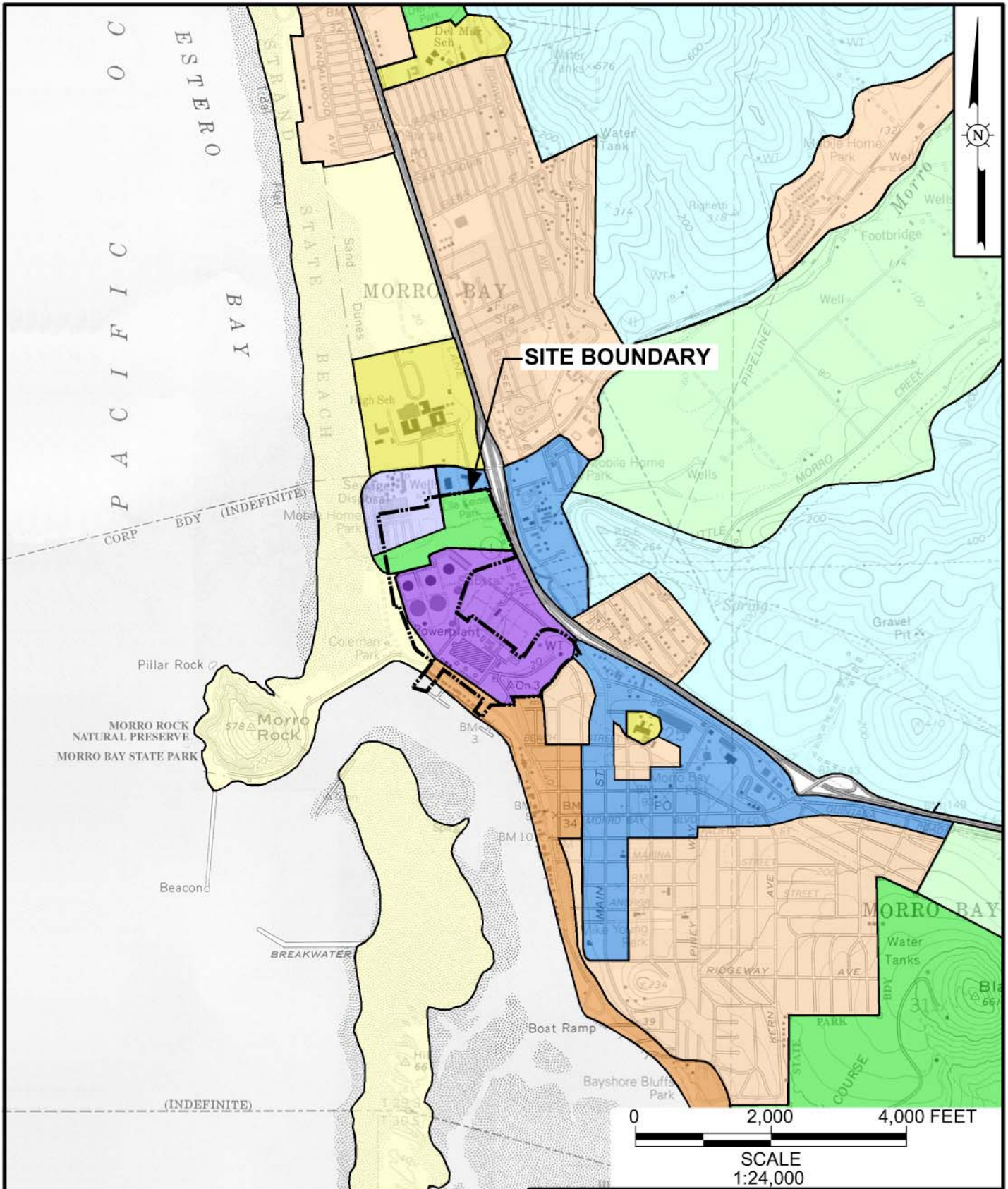
The City's noise standards provide control so that unnecessary, excessive and/or annoying sounds from a development or usage do not affect an adjacent property. By comparing existing noise levels and noise level standards to the expected noise levels that will be generated by the Project, the effect of Project-related noise can be determined.

6.12.1.2 Site Vicinity

The area in the vicinity of MBPP consists of recreational, residential, commercial and business land uses. Recreational areas include a marina, Coleman Beach Park, and Morro Rock. The nearest residences are located on Scott Avenue, southeast of the plant. Commercial uses include transient lodging facilities such as the Morro Dunes (RV) Trailer Park and numerous hotels. The central Morro Bay Business District is located along Main Street and Morro Bay Boulevard. Other than residences, potential noise sensitive land uses in the area include the Morro Bay Library, Morro Bay High School, Morro Bay Elementary School, and several churches. Industrial facilities in the vicinity of the MBPP include a gravel plant and a City water treatment plant. A land use map of the area is presented as Figure 6.12-1.

To evaluate noise levels expected by the MBPP modernization, existing noise levels in the vicinity of the Project site were measured. Prior to actual measurement of existing noise levels, a general review of the types of noises in the area was performed and is described in the next few paragraphs. The actual noise measurement process is described next, with the results of the noise measurements provided in a summary table for convenience.

Nighttime noise sources in the area varied by location, though the existing MBPP could be heard, at most locations. For example, at the hillside residential area near the intersection of Radcliff and Berwick Drive (across Highway 1), a low-pitched hum was most prevalent at night. The hum mostly comes from the existing power plant's transformers which are located immediately behind the main power building and which pass power to the Pacific Gas and Electric (PG&E) switchyard (also located behind the main power building). This low-frequency hum is less readily absorbed in the atmosphere than higher-pitched sounds and, thus, can be heard more clearly at greater distances. The loudest hum was shown to emanate from the oldest transformers (associated with Units 1 and 2). These older transformers are from the 1950s, when the MBPP was first built. Modern transformers, such as those to be used for the Project, are considerably more efficient and will, therefore, make much less noise.



In the residential areas along Scott Avenue adjacent to the plant and in areas to the south through the business district up to the hillside areas near Piney Way and Olive Streets, the low hum from the transformers cannot be heard very well. Instead a slightly higher pitched sound can be heard. The higher pitched sound comes from the existing plant's fans, which are located near the stacks, facing the Embarcadero. The MBPP fans move air into the boiler to facilitate proper operation of Units 1 through 4. The sound of the MBPP fans is also prevalent along the Embarcadero at night.

Sounds during the nighttime in the trailer park area across Morro Creek and also along the beach are a mixture of the low-frequency hum from the transformers and the higher pitched sounds of the fans.

During the day, the MBPP cannot be heard as much from the more distant monitoring locations. The plant can clearly be heard at closer locations, such as Scott Avenue. As one moves farther away, other sounds in the area are louder and tend to cover up the sound of the plant. Some of these sound sources that cover up the noise from the MBPP include noise from traffic on Highway 1, surf noise, birds, and other natural sounds. A summary of the observed noises at each noise measurement location (day and night), is presented in Table 6.12-2.

6.12.1.3 Noise Measurements

6.12.1.3.1 Introduction

Noise measurements were taken during the winter and summer to compare different types of noise conditions. The noise measurements were taken in January and June of 1999, and supplemented in July of 2000.

Noise levels at MBPP typically follow power generating load levels, which normally rise and fall, based on the demand for electricity. The operations of the MBPP and the associated noise levels generally follow a daily pattern. For example, MBPP starts to generate power as people wake up and start their daily activities, starting around 5:00 to 6:00 a.m. Noise from the MBPP also increases at that time when this demand for power is increasing. Noise from the power plant can be heard fairly clearly at the early hour, though, because only a few cars are on the roadways and minimal local commercial activity has begun. Cars and commercial activity tend to offset the plant sounds. As the morning continues, the power plant generates more power as demand for electricity increases, however, background noise also increases as additional local activities increase and power plant noise begins to be less evident. The amount of power generated can go up and down throughout the day, but it is generally high through the majority of daytime hours. Because

TABLE 6.12-2

**OBSERVED NOISE SOURCES
MORRO BAY NOISE MONITORING**

LOCATION	OBSERVED NOISE SOURCES		DISTANCE (feet)	
	Daytime	Nighttime	From Site of New Units	From Existing Power Plant
Scott Avenue	Plant, Traffic	Traffic, Plant	2,100	1,350
Morro Bay High School	Traffic, Natural Sounds	Surf, Traffic	2,300	3,300
Morro Bay Elementary School	Traffic, Natural Sounds	Natural Sounds, Traffic	3,500	2,600
Radcliff Street and Berwick Drive Intersection	Traffic, Plant	Traffic, Plant	2,800	2,600
Morro Dunes Trailer Park	Traffic, Natural Sounds, Aircraft	Surf, Traffic, Natural Sounds	900	1,800
First Church of Christ Scientist	Traffic, Plant, Aircraft, Natural Sounds	Plant, Natural Sounds, Surf, Traffic	3,000	2,100
Morro Bay Library	Traffic	Surf, Natural Sounds	4,500	3,600
Olive Avenue and Piney Way Intersection	Traffic	Traffic, Plant	6,600	5,600
Plant Entrance	Plant Traffic	Plant, Surf, Natural Sounds	1,100	500
Salt Water Taffy at Embarcadero	Power Plant, Vehicles, People	Power Plant, Vehicles in Parking Lot	1,400	600
Public Park (Embarcadero and Coleman)	Cars, Seagulls, People Talking	Power Plant, Airplane	2,300	1,200
Public Beach Shoreline	Surf, Birds, People Talking, Plant Faintly Audible	Surf, Frogs at Wash, Distant Radio, Airplane, Plant Faintly Audible	1,700	2,300
Morro Rock - East Side	Birds, Waves, Vehicles, Plant Not Audible	Birds, Waves, Plant Audible	2,800	2,600
Morro Rock - West Side	Waves, People Talking, Birds, Plant Not Audible	Waves, Seagulls, Plant Not Audible	4,300	4,100

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generally high levels of electricity are generated throughout the day, MBPP noise levels are also highest during the day. However, as the noise measurements described below indicate, MBPP sounds are not very audible during the day outside of the immediate vicinity along the Embarcadero. This is due to the presence of other daytime activities, most notably cars on city streets and Highway 1, as well as other sounds associated with commercial activity in the area.

High power generating activity and high noise levels are noticeable into the evening as people return home from work, have dinner, and use electricity for recreational activities (e.g., television), or while they relax. MBPP power generating levels usually begin to decline by 8:00 or 9:00 p.m., though during very high demand periods (e.g. during summer heat spells), they can last until midnight. Once MBPP power generating levels decline for the evening, noise levels from the plant are lower. These lower noise levels remain that way for most of the night until the cycle repeats itself again starting at 5:00 to 6:00 a.m.

To assess the ambient noise environment in the tourist-related areas adjacent to the MBPP, noise levels were also measured in public recreational areas around Morro Rock, near the beach dunes (northeast of Morro Rock), and the beginning of the Embarcadero District (south of Coleman Drive and across from the existing plant).

These measurements indicate what one would intuitively expect: that areas nearest to the plant currently experience the most noise. For example, at the Salt Water Taffy located at the Embarcadero directly across from the MBPP, daytime and nighttime noise was mostly due to the plant. MBPP sounds could be clearly heard at this location during all hours. At the Public Park located at the intersection of Embarcadero and Coleman, MBPP noise was not as clearly heard during the daytime, but late at night, was clearly heard. At the Public Beach Shoreline, the power plant could only be heard faintly during both the daytime and nighttime. At the east side of Morro Rock, plant noise could not be heard during the daytime, but noise from specific types of plant equipment, such as the generators, transformers, and fans could be heard during the late night and early morning periods. Plant noise could not be heard at the west side of Morro Rock, because the rock acts as a shield against plant noises.

6.12.1.3.2 Methodology

Noise monitoring was conducted on January 28-29, 1999 at locations that were identified based on discussions with City of Morro Bay planning staff regarding potential sensitive receptors. Supplemental sound measurements were also performed during the week of June 26, 1999 through July 2, 1999 at the same locations plus the intersection of Olive and Piney Way. Finally, another set of noise measurements was taken on July 5 and 6, 2000 at selected tourist-oriented locations near the Project site. Appendix 6.12-1 contains the noise analysis technical report for these measurement programs.

The January 1999 noise monitoring program consisted of a continuous and simultaneous 25-hour survey at four noise sensitive monitoring locations, and short-term (15-minute) monitoring at four additional locations. A complete 25-hour data set was collected at the nearest residential receptor and one school. Equipment problems resulted in slightly less data collection at the remaining two continuous monitoring locations. No less than 24 hours of data were collected at these other locations. Short-term monitoring was also conducted at the four continuous monitoring locations plus the Olive and Piney Way intersection to supplement the continuous data and to make observations of the local noise sources. Octave band sound level measurements were also performed at each of the monitoring locations during the day and late at night.

Brüel & Kjaer Model 2236C and 2236D precision integrating sound level meters with integral data loggers were utilized for this program. These meters meet ANSI S1 4-1983 requirements for precision Type 1 sound level meters. The meters were calibrated before and after each survey period using a Brüel & Kjaer Model 4231 sound level calibrator. The microphones were fitted with windscreens to reduce wind-generated noise and were mounted at a height of approximately 5 feet above the ground.

The continuous instruments were programmed to measure and record the L_{eq} , and the statistical sound levels exceeded 10 and 90 percent of the time (L_{10} and L_{90}). These levels were measured and recorded every 10 minutes over the duration of the 25-hour daytime and nighttime survey period. At the end of the period, the data were downloaded to computer for storage and analysis. Graphs of the data were produced for presentation. The short-term measurements also included the measurement of the L_{50} levels.

L_{90} octave band measurements were also performed during the day and late at night to determine the tonal characteristics of the residual or background noise levels. These data were obtained with a Brüel & Kjaer Model 2236C sound level meter.

In addition to noise level measurements, the contributing noise sources were identified and recorded, along with prevailing meteorological conditions. Wind speed and direction were obtained via a Dwyer hand-held wind meter and compass and/or determined by examining a topographic map of the area. Temperature was measured with a thermistor. Sky conditions were observed and recorded at each location.

Additional short-term noise level and sampling was performed on July 5 and 6, 2000, in response to concerns raised in public meetings about tourist areas in the Embarcadero and also beach areas near Morro Creek. The additional short-term sampling survey was conducted using a Brüel & Kjaer Model 2260 Noise Investigator and two Larson-Davis 820 Sound Level Meters (SLMs). These meters meet ANSI S1. 4-1983 requirements for precision Type 1 sound level meters. The meters were calibrated before and after each survey period using a Brüel & Kjaer Model 4230 sound level calibrator. The microphones were fitted with windscreens to reduce wind-generated noise and were mounted at a height of approximately 5 feet above the ground.

The July 2000 tourist impact area survey collected and stored 15-minute samples of the L_{eq} , L_{max} , L_{min} , as well as statistical sound levels (L_1 , L_{10} , L_{25} , L_{50} , L_{90} , and L_{99}) at several representative times of the day and night (such as mid-day, evening, and late night). At the end of the survey, the data were downloaded to computer for storage and analysis. In addition to noise level measurements, the contributing noise sources were identified and noted, as were the prevailing meteorological conditions and sky cover.

6.12.1.3.3 Monitoring Locations

As discussed above, fourteen monitoring locations were chosen to represent the study area. The monitoring location descriptions are presented below and depicted in Figure 6.12-2.

Identified Noise-Sensitive Receptors

- | | |
|--|---|
| (1) Scott Avenue | Monitoring was conducted on this street, as it contained the nearest residences to MBPP. |
| (2) Morro Bay High School | This location was at the entrance driveway to the High School. Monitoring was conducted at the southern end of the school, just south of the parking lots. |
| (3) Morro Bay Elementary School | Monitoring was conducted at the end of the main parking lot of the school. The meter was located at a small chain link fence. |
| (4) Radcliff Street and Berwick Drive Intersection | Data were collected at this residential development across Highway 1 from MBPP. Although traffic noise was dominant here during the day, it was desired to characterize the nighttime noise environment when traffic was minimal. |

Identified Noise-Sensitive Receptors

- | | | |
|-----|---|--|
| (5) | Morro Dunes RV Park | This trailer park is located north of MBPP. According to the park manager, the facilities are used for transient lodging, with stays normally less than 2 weeks in duration. Data were collected at the southernmost portion of the park (nearest to the plant). |
| (6) | First Church of Christ Scientist | Data were collected in the parking lot of this former church at the corner of Beach Street and Morro Avenue. |
| (7) | Morro Bay Library | Data were collected in the parking lot of the library, at the corner of Shasta and Harbor Avenues. |
| (8) | Piney Way and Olive Avenue Intersection | Data was collected at this location to Olive Avenue Intersection identify noise conditions in the residential area often referred to as The Heights. |

Supplemental Assessment Receptors

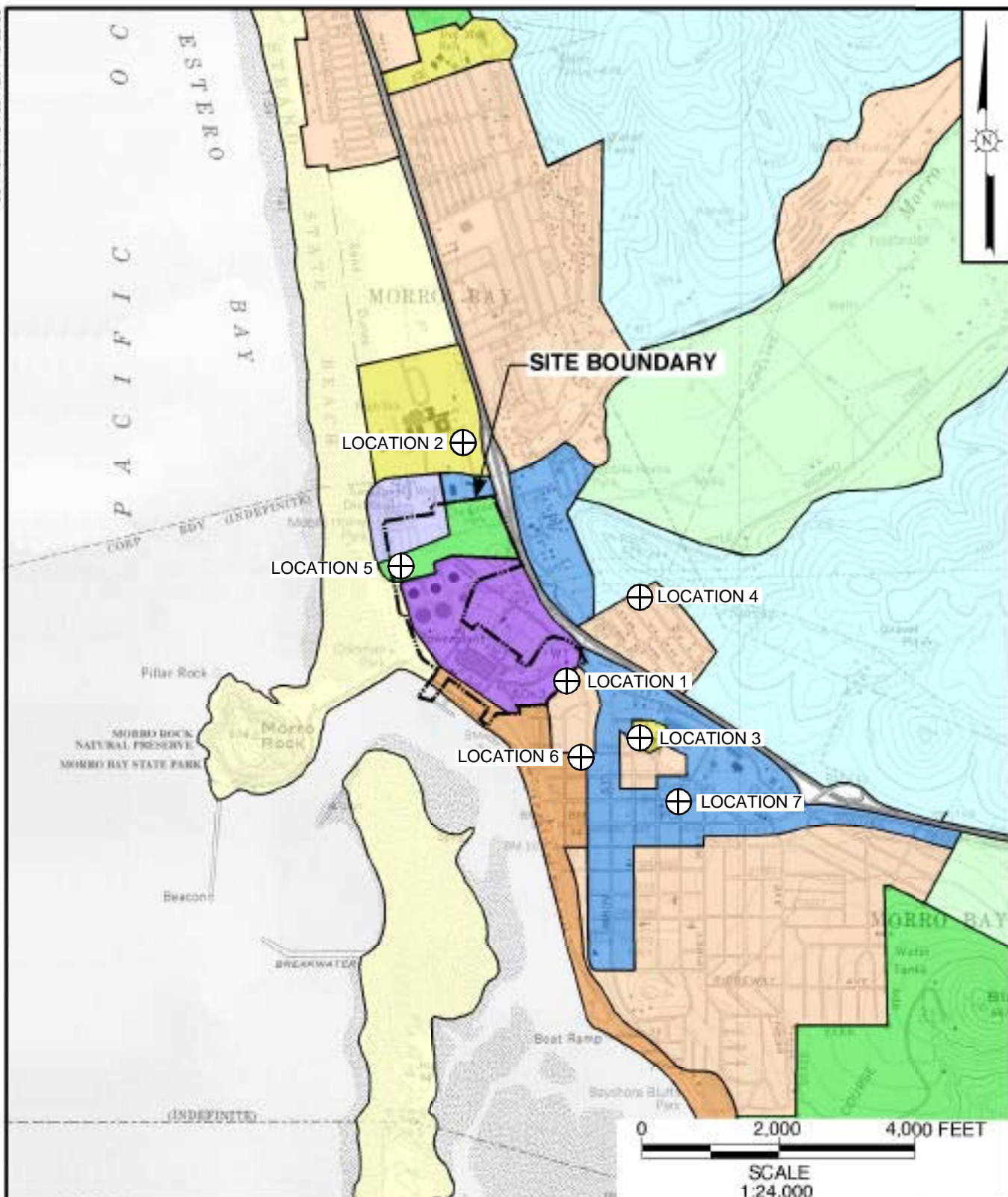
- | | | |
|------|--|---|
| (9) | MBPP Entrance | Monitoring was conducted at the MBPP entrance to collect property line noise level data. |
| (10) | Embarcadero Retail Area | Monitoring was conducted at the Salt Water Taffy at 1247 Embarcadero. This retail tourist spot is located directly across from the Plant. |
| (11) | Public Park (Coleman and Embarcadero) | Data was collected at this location at a park bench area northwest of the swings. |
| (12) | Public Beach Shoreline | Monitoring was conducted at the shoreline just south of the Morro Creek as it enters Estero Bay. |
| (13) | Morro Rock, East Side | Data was collected at this high tourist attraction. |
| (14) | Morro Rock, West Side | Monitoring was conducted at this attraction, northeast of the breakwater. |

In summary, Locations 1 through 8 are considered to be noise sensitive locations and, in accordance with the Commission's requirements, were chosen as monitoring locations. As discussed, monitoring was conducted at Location 9, the MBPP entrance, to collect property line noise level data. Also, noise data were collected at Locations 10 through 14 to document noise levels in tourist areas near the MBPP.

6.12.1.3.4 Monitoring Results

Continuous 25-Hour Data

The weather during the 25-hour monitoring period (January of 1999) consisted of mostly clear skies with predominantly light winds that varied from location to location. In general, the daytime winds were 5 to 10 miles per hour (mph) or less from the east and nighttime winds were mostly calm, except for west winds of 5 to 10 mph at the Elementary school, Church, and Plant Entrance locations. Temperatures ranged from between 60 to 65 degrees Fahrenheit (°F) during daytime hours and 45 to 50° F at night.



LEGEND

	AGRICULTURE - ROW CROPS/OLD FIELDS		BEACH/RECREATION
	AGRICULTURE - OPEN SPACE/GRAZING		POWER PLANT
	INDUSTRIAL		RESIDENTIAL
	PARK		COMMERCIAL
	SCHOOL		VISITOR SERVICES

SOURCES: USGS 7.5 MINUTE TOPOGRAPHIC MAP OF MORRO BAY NORTH AND MORRO BAY SOUTH CALIFORNIA DATED 1985 AND 1994

NOISE MONITORING LOCATIONS AND EXISTING LAND USES

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-2

The Commission requires 25-hour monitoring from a minimum of one location. Other locations can be monitored for shorter durations during the same 25-hour period, at the Applicant's discretion. Four 25-hour monitoring locations were selected for MBPP. The continuous monitoring data from the survey are depicted graphically in Figures 6.12-3 through 6.12-6. The data are presented as a series of curves, corresponding to the measured L_{eq} , L_{90} and L_{10} noise levels. Each 10-minute data set was plotted.

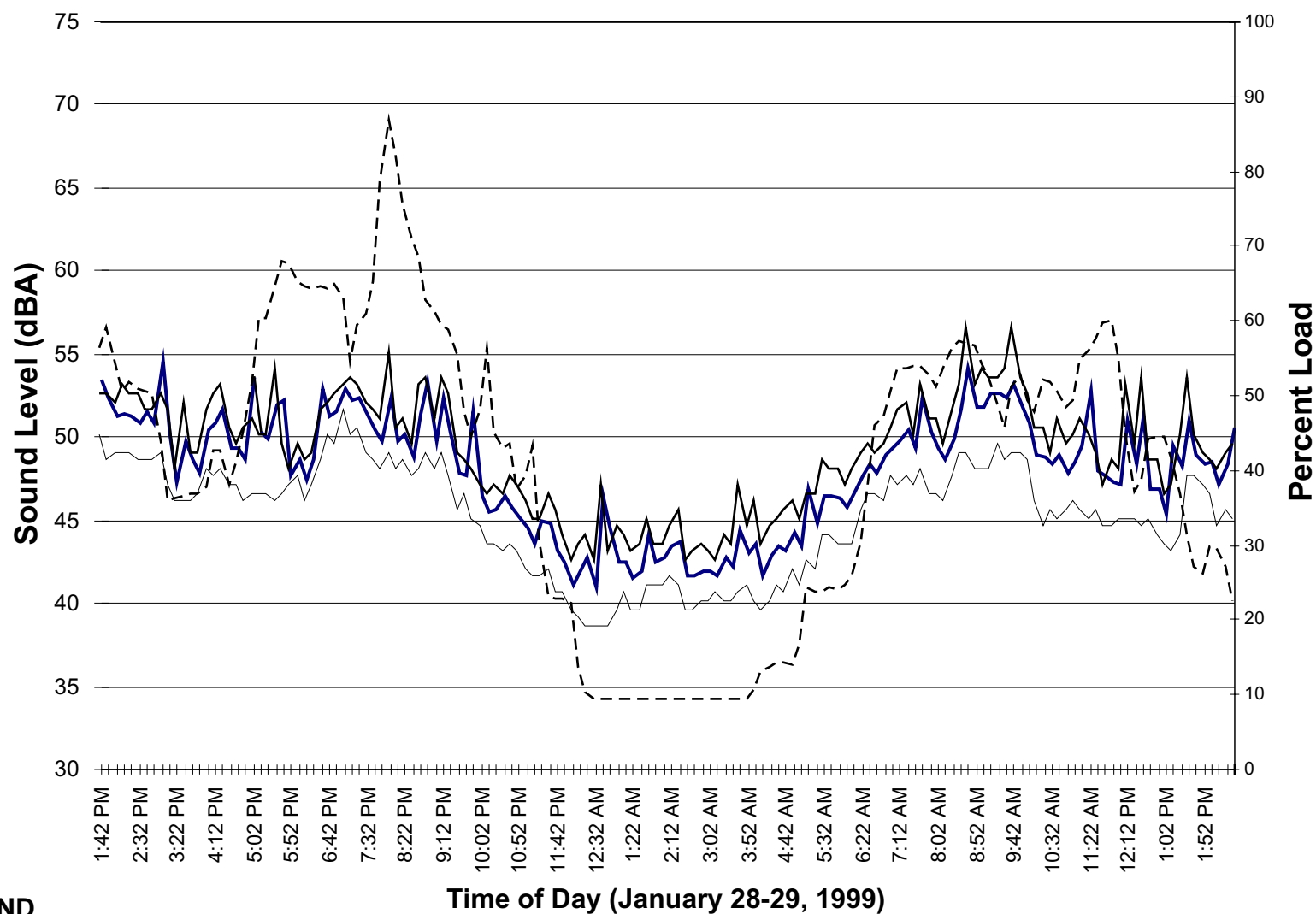
The L_{eq} curve is representative of all the sounds present at the measuring location. The L_{90} is representative of sound produced by sources of relatively constant noise level, such as would be expected from MBPP or, possibly, steady traffic flow on Highway 1. The L_{10} reflects intrusive sounds, such as nearby car and truck traffic on local streets and aircraft overflights. The spread between the L_{90} and L_{10} levels provides an indication of the amount of intrusive noise present at any location. A small spread indicates a steady, constant noise level with only a few intrusive sounds.

Data collected at the four continuous monitoring locations reveal similar noise patterns, with higher noise levels during the day and lower levels during late night hours. Late night L_{90} noise levels were similar at all four locations, generally around 40 dBA.

Data collected at the Scott Avenue location (see Figure 6.12-3) reveal the smallest spread between L_{90} and L_{10} levels at all hours of the day, indicating a steady noise environment, most likely due to dominant sources from the power plant across the street. Daytime L_{90} levels were found to be approximately 45 to 50 dBA, while nighttime levels dropped off to 40 dBA.

More variable noise levels were measured at the high school (see Figure 6.12-4). The spread between L_{90} and L_{10} levels is similar here during all hours of the day. This location is affected by intrusive noises during the day, which consisted of cars entering and leaving the school and trucks coming and going from the gravel plant on Atascadero Road. The highest daytime levels were measured at this location, no doubt due to these intrusive sounds. At night, intermittent traffic on Highway 1 produced intrusive sounds because highway traffic is sparse at this time. The L_{90} levels here ranged from 50 to 55 dBA during the day and were approximately 40 dBA at night.

At the Morro Bay Elementary School (see Figure 6.12-5), noise levels were found to be more variable during the day, due to a lack of consistent activity at the school and traffic on the local roadways. At night, the spread between the L_{90} and L_{10} levels was small, indicating a more steady noise environment in the absence of school or traffic activities.

**LEGEND**

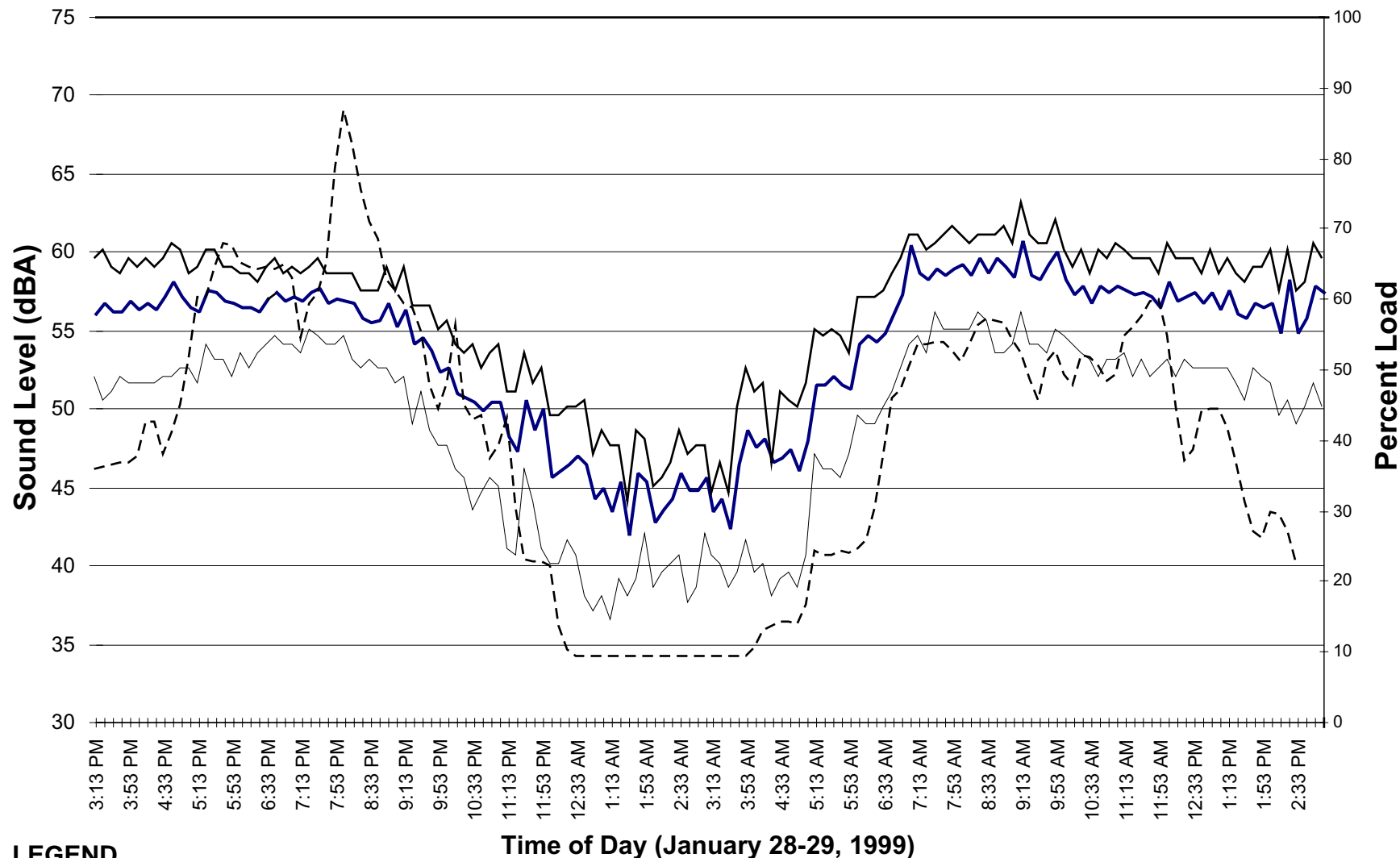
- Leq
- L₁₀
- L₉₀
- - - Units 3 & 4 Percent Power Generating Load

**MEASURED SOUND LEVELS
LOCATION 1 - SCOTT AVENUE**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-3

**LEGEND**

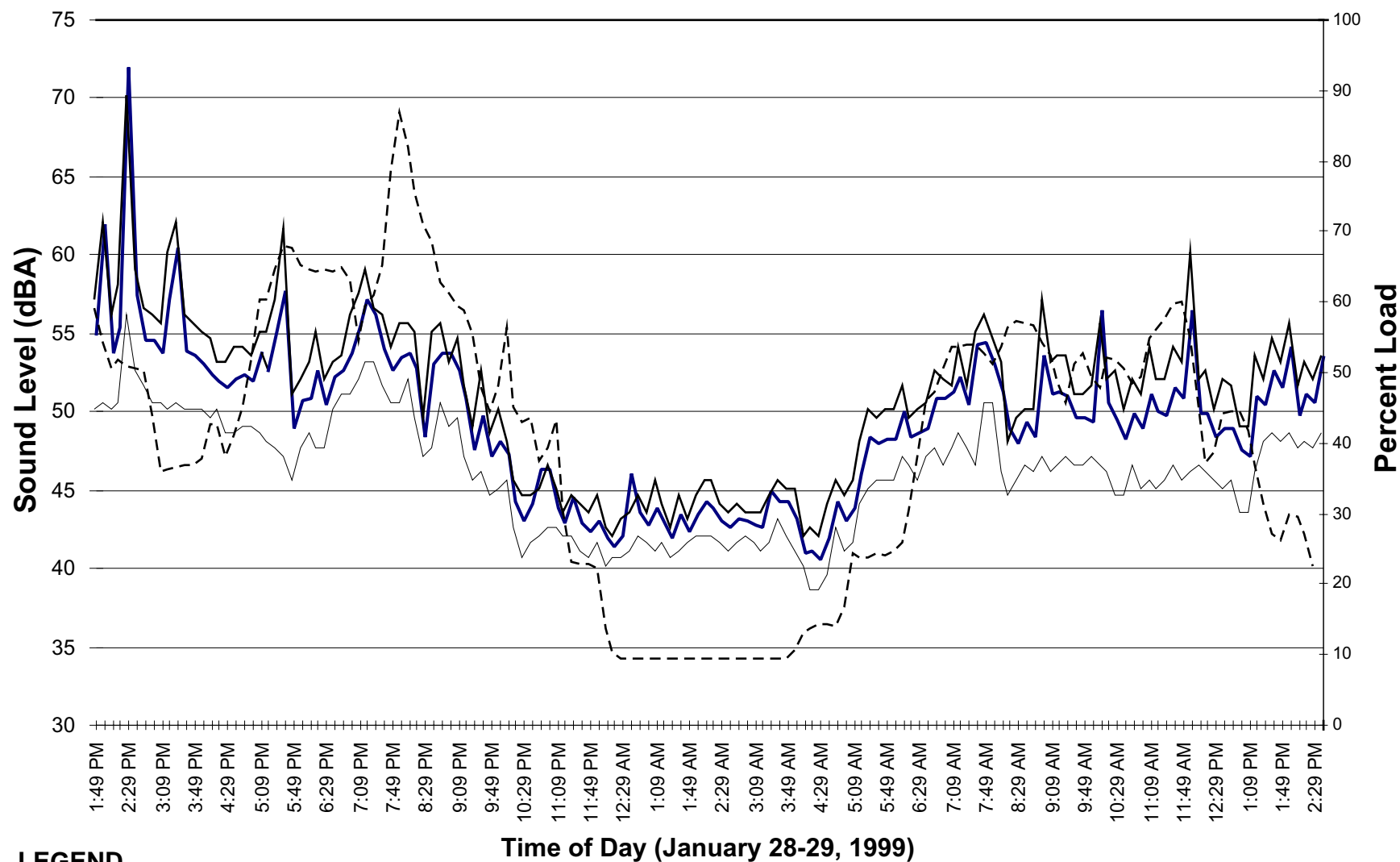
- Leq
- L₁₀
- L₉₀
- - - Units 3 & 4 Percent Power Generating Load

**MEASURED SOUND LEVELS
LOCATION 2 - MORRO BAY HIGH SCHOOL**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-4

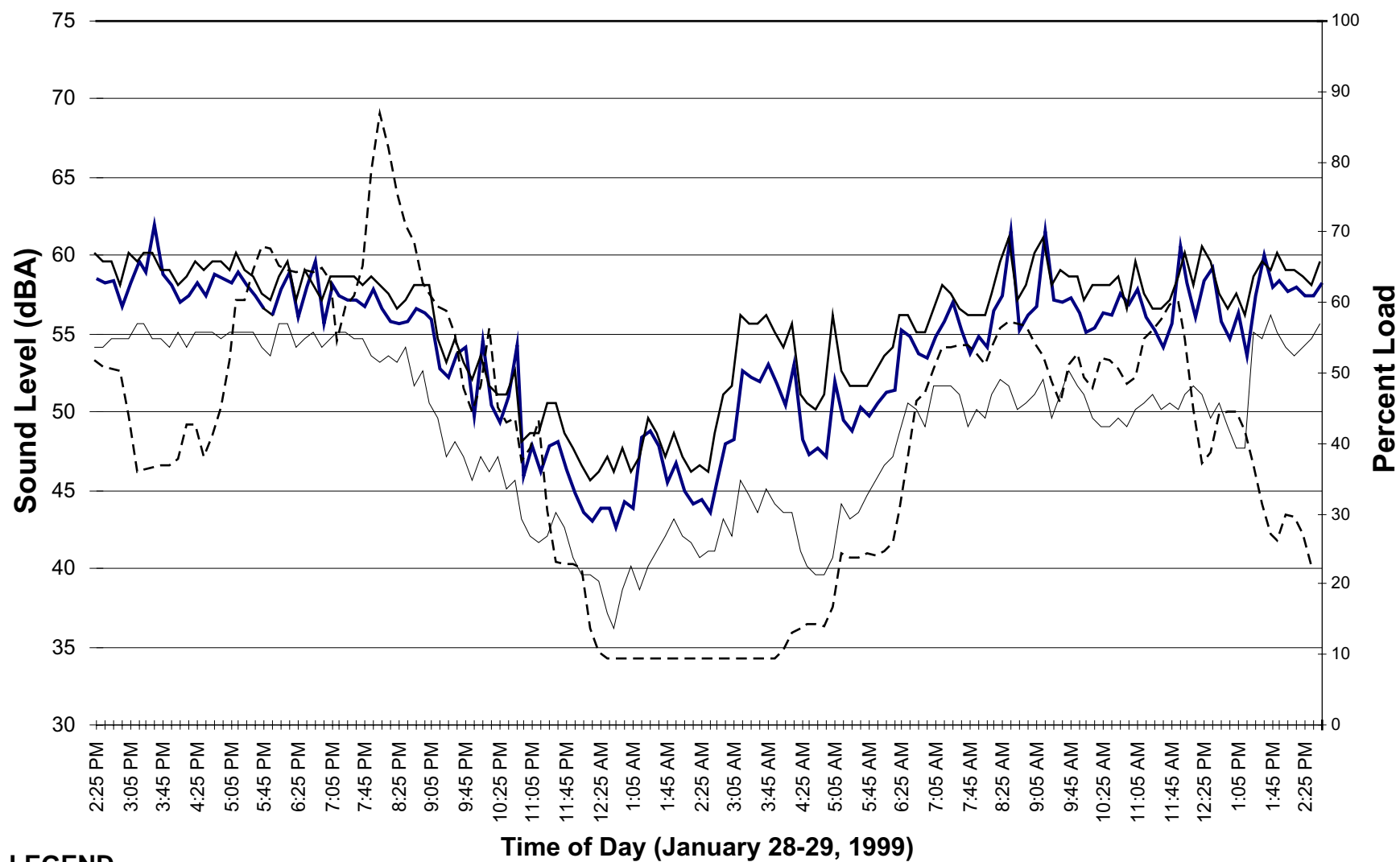


**MEASURED SOUND LEVELS
LOCATION 3 - MORRO BAY ELEMENTARY
SCHOOL**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-5

**LEGEND**

- Leq
- L₁₀
- L₉₀
- Units 3 & 4 Percent Power Generating Load

**MEASURED SOUND LEVELS
LOCATION 4 - RADCLIFF STREET AND
BERWICK DRIVE**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-6

The noise environment at the Radcliff Street location (see Figure 6.12-6) is largely related to vehicular traffic on Highway 1 during the day. Noise levels were observed to vary somewhat during the day, especially when large trucks passed on Highway 1, or when local traffic was present. Traffic on Highway 1 was observed to be very light late at night, and MBPP was more audible. Daytime L_{90} levels here ranged from 50 to 55 dBA during the day and 40 to 45 dBA late at night.

Short-Term Data

The January 1999 continuous data collection was supplemented with short-term (15-minute) measurements taken in the same locations. Short-term measurements were conducted at five additional locations (four noise-sensitive locations and the MBPP entrance). These short-term measurements included measurement of the L_{50} noise level, as required by the Commission. Results of the short-term monitoring for all nine locations are presented in Table 6.12-3 and Table 6.12-4.

Short-term data collected at night at the four continuous locations, show noise levels that are similar to the long-term graphical data presented in Figures 6.12-3 through 6.12-6. In fact, the short-term data from the remaining five noise sensitive locations reveal that noise levels at all nine sensitive receptor locations are similar at night, though the lower sound levels measured at the Piney Way/Olive intersection confirm typical noise attenuation with distance. On the other hand, noise levels were found to be more variable during the day due to intrusive and other noise sources which were not present at night.

Noise level data collected at the MBPP property line (Location 9) revealed nearly identical noise levels during the day and late at night, mainly because the power plant is so close to that location.

During the short-term noise measurements, information was also gathered on the generating load levels of the existing power plant. This information is shown in Tables 6.12-3 and 6.12-4. The information indicates that, with the exception of noise levels at or near the MBPP entrance, daytime noise levels in Morro Bay vary only slightly or do not change at all whether Units 3 and 4 are operating by themselves at full load or whether Units 1 through 4 are all operating at full load. This is confirmed by the naked ear, which often cannot hear the plant at all during the day at many locations in Morro Bay, and certainly cannot distinguish between conditions with one, two, or all four of the existing power generating units operating. The inability to distinguish between these

TABLE 6.12-3

**SHORT-TERM DAYTIME NOISE LEVEL DATA
MORRO BAY NOISE MONITORING**

LOCATION	DAYTIME (Units 1 through 4)					
	Monitoring Period	L _{eq}	L ₉₀	L ₅₀	L ₁₀	MBPP Power Generating Load (%)
Scott Avenue	June 26 / 1000 - 1015	51	48	49	50	90
Morro Bay High School	June 26 / 1030 - 1045	60	54	57	62	90
Morro Bay Elementary School	June 26 / 1100 - 1115	51	46	48	52	90
Radcliff Street and Berwick Drive Intersection	June 26 / 1130 - 1145	58	55	57	59	90
Morro Dunes Trailer Park	June 26 / 1200 - 1215	50	45	46	50	90
First Church of Christ Scientist	June 26 / 1230 - 1245	61	47	58	66	90
Morro Bay Library	June 26 / 1300 - 1315	55	48	53	58	90
Olive Avenue and Piney Way Intersection	June 26 / 1330 - 1345	43	40	41	46	90
Plant Entrance	June 26 / 1400 - 1415	72	70	71	73	90
Softwater Taffy	7/6/00 / 1035 - 1050	67	64	67	70	90
Public Park	7/5/00 / 1700 - 1800	56	52	55	58	90
Public Beach Shoreline	7/6/00 / 1100 - 1115	62	55	58	62	90
Morro Rock - East Side	7/6/00 / 1200 - 1300	52	47	50	54	90
Morro Rock - West Side	7/5/00 / 1700 - 1800	59	56	58	61	90

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Note: Values in Italics are estimated.

TABLE 6.12-4

**SHORT-TERM NIGHTTIME AMBIENT NOISE LEVEL DATA
MORRO BAY NOISE MONITORING**

LOCATION	NIGHTTIME (Units 1 through 4)					
	Monitoring Period	L _{eq}	L ₉₀	L ₅₀	L ₁₀	MBPP Power Generating Load (%)
Scott Avenue	June 27 / 2300 - 2315	43	41	42	45	80
Morro Bay High School	June 27 / 2330 - 2345	45	42	43	47	80
Morro Bay Elementary School	June 27 / 0000 - 0015	45	42	44	46	70
Radcliff Street and Berwick Drive Intersection	June 27 / 0030 - 0045	43	42	41	46	60
Morro Dunes Trailer Park	June 27 / 0100 - 0115	42	40	42	44	40
First Church of Christ Scientist	June 27 / 0130 - 0145	46	43	45	47	10
Morro Bay Library	June 27 / 0200 - 0215	42	40	41	43	10
Olive Avenue and Piney Way Intersection	June 27 / 0230 - 0245	37	36	35	39	10
Plant Entrance	June 27 / 0300 - 0315	61	60	60	62	10
Saltwater Taffy	7/6/00 / 0005 - 0020	67	63	67	69	10
Public Park	7/5/00 / 2343 - 2358	57	54	57	60	10
Public Beach Shoreline	7/5/00 / 2320 - 2335	62	55	58	62	10
Morro Rock - East Side	7/6/00 / 0300 - 0400	48	46	48	50	10
Morro Rock - West Side	7/6/00 / 0300 - 0400	53	49	52	55	10

98-710/Rpts/AFC(text)/TbIs/Sec 6 (10/21/00/rm)

Note: Values in Italics are estimated.

conditions is because daytime noise levels in Morro Bay are primarily influenced by local traffic and commercial activities. Consequently, the current MBPP is not a significant contributor to daytime noise levels at most locations in Morro Bay.

In addition to the 1999 measurements, short-term noise measurements were conducted at five noise-sensitive tourist areas in July of 2000. The short-term measurements were conducted during the daytime, nighttime, and early morning periods to compare various noise conditions. Tables 6.12-3 and 6.12-4 also list the measured noise levels for this supplemental survey.

As one might anticipate, this short-term measurement data indicates that tourist areas closest to the plant currently experience the most power plant noise. Locations further away from the plant experience more power plant noise when other background noise drops at night and in the early morning hours. In general, for all of these noise sensitive tourist areas, noise levels were higher during the day than at night and in early morning periods. This is consistent with the data at sensitive receptor locations described above, and is primarily attributed to increased human activity.

Weather during the short-term noise-sensitive tourist area measurements was mild and typical for the Central California Coast during the month of July. The sky was mostly clear and the relative humidity ranged from 38 percent to 72 percent. Winds were mostly calm, but occasionally gusts above 10 miles per hour were recorded. Wind direction ranged from the south, north, northwest, and east.

At the Salt Water Taffy located at the Embarcadero directly across from the Plant, noise was mostly due to the plant just across the street. The sounds of the generators and fans could be clearly heard at this location. Noise from commercial activity, tourist and vehicular traffic could also be heard, but the power plant was the primary source of noise at that location.

At the Public Park located at the intersection of Embarcadero and Coleman, noise from vehicles on the nearby roadways, seagulls, people talking, and aircraft, could be heard in addition to sounds from the Plant. During the day noise from vehicles, seagulls, and people talking at the park were loudest. Plant noise could not be clearly heard during the daytime. But late at night, the generator, fan, and transformer noise generated by the Plant could clearly be heard and was the primary source of noise.

Noise measurements were conducted at the east and west sides of Morro Rock. At the east side of Morro Rock, the main sources of noise were from birds, waves hitting the shoreline, vehicles, and the Plant. During the day and late at night, noise generated by the Plant could not be heard very well. The primary sources of noise during the day and late at night were from birds and vehicles. The only time noise from the plant could be heard clearly was in the early morning when very little other background activity was occurring. During these early morning hours, noise from birds could still be heard, but noise from the surf was in lower, which allowed the plant to be heard. The sources of noise at the west side of Morro Rock were waves, people talking, birds, and an occasional airplane flyover. Noise from the plant could not be heard at this location during the day, at night, or in the early morning hours.

At the Public Beach Shoreline, the main sources of noise were from surf, frogs, people talking, radios, occasional aircraft flyovers, and the plant. During the day, noises from the plant could only barely be heard. Most measured daytime noise was from the surf, birds, and people talking. At night, the power plant could be heard a little bit better, but most measured noise came again from the surf, frogs within the wash, a distant car radio, and an aircraft flyover.

Composite Noise Descriptors

Composite noise descriptors, including the L_{dn} , CNEL and $L_{eq(24)}$, were calculated from the data collected at the four continuous monitoring locations. The calculated descriptors are provided in Table 6.12-5.

TABLE 6.12-5

COMPOSITE NOISE DESCRIPTORS MORRO BAY NOISE MONITORING

LOCATION	COMPOSITE NOISE DESCRIPTORS		
	CNEL	L_{dn}	$L_{eq(24)}$
Scott Avenue	53	53	49
Morro Bay High School	60	60	56
Morro Bay Elementary School	56	56	54
Radcliff Street and Berwick Drive Intersection	59	59	56

Octave Band Data

L₉₀ octave band data measurements were performed at key monitoring locations during the day and late at night. Because intrusive sounds are at a minimum late at night, the nighttime data are more representative of background noise from the plant. These data are presented graphically in Figure 6.12-7 through Figure 6.12-14 at the identified sensitive-receptor locations.

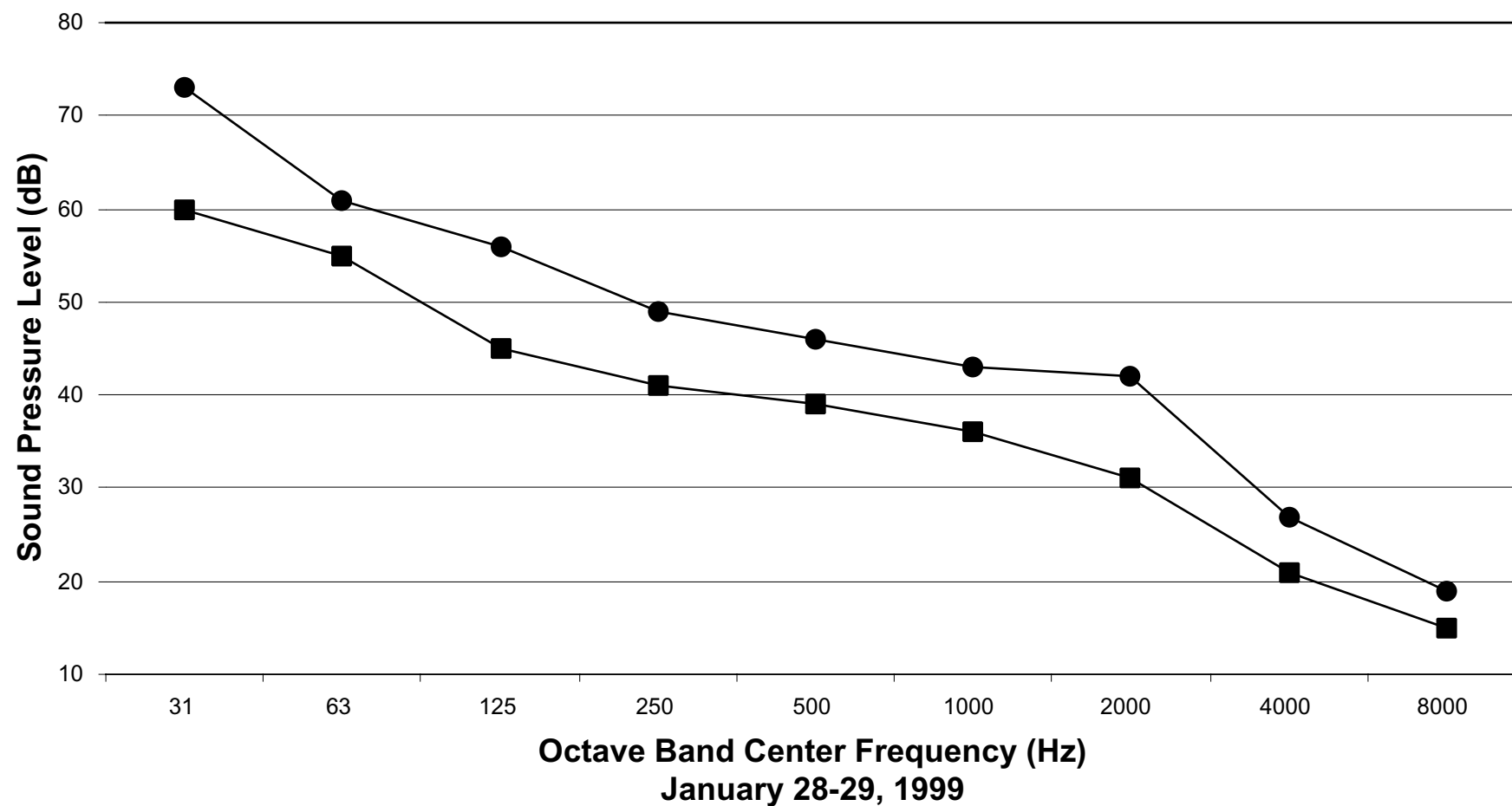
A review of the data reveals that, with two exceptions, the octave band spectra at all locations have the same general downward trend, which is typical for an ambient environment because higher frequency noises are more readily absorbed in the atmosphere. One exception is a slightly higher noise level in the 125 Hertz (Hz) frequency at the high school location, although no distinct pure tone noise was audible here. The other exception is the higher levels in the 4,000 and 8,000 Hz bands measured at the library. This occurred because prior to the octave band measurements being taken, a water sprinkler turned on automatically and stayed on for an extended duration.

Some pure tone noises were detected in the lower octave band frequencies during the ambient noise monitoring program. The noises are most likely being generated by the existing Units 3 and 4 forced-draft fans and transformers.

6.12.2 IMPACTS

Significance criteria were determined based on California Environmental Quality Act (CEQA) Guidelines, Appendix G, Environmental Checklist Form (approved January 1, 2000) and on performance standards or thresholds adopted by responsible agencies. An impact may be considered significant if the Project results in:

- An increase in the existing late night L₉₀ noise levels by 5 dBA or more, which is the threshold that has been determined to be significant by the Commission.
- Exposure of persons to or generation of noise levels in excess of standards established in the Morro Bay Noise Element.
- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project.
- Exposure without appropriate protection to onsite noise levels in excess of worker safety standards set by California Occupational Safety and Health Administration (Cal-OSHA) and by the U.S. Occupational Safety and Health Administration (OSHA).

**LEGEND**

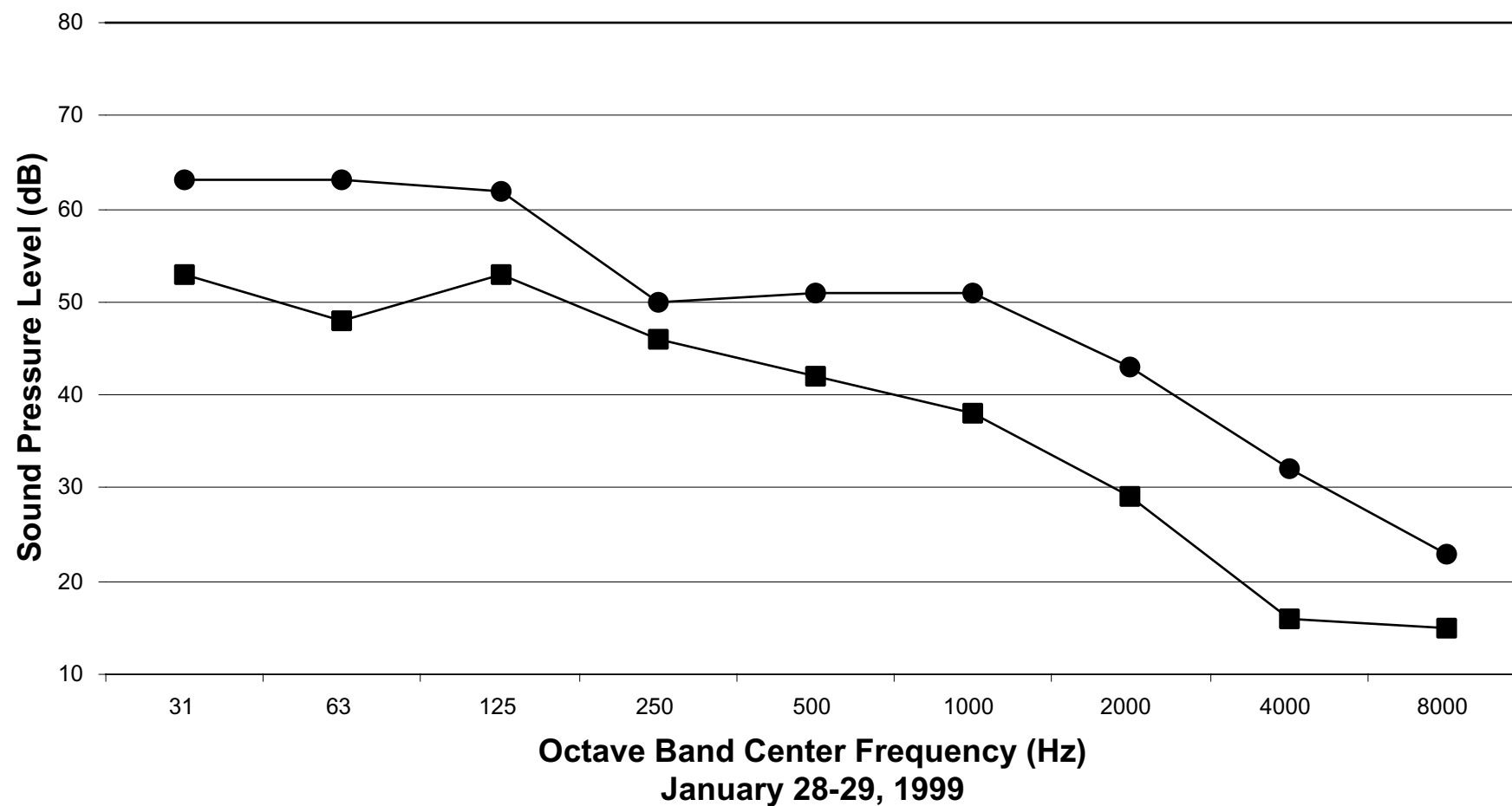
- DAYTIME
■ NIGHTTIME

**MEASURED OCTAVE BAND SOUND
PRESSURE LEVELS
LOCATION 1 - SCOTT AVENUE**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-7

**LEGEND**

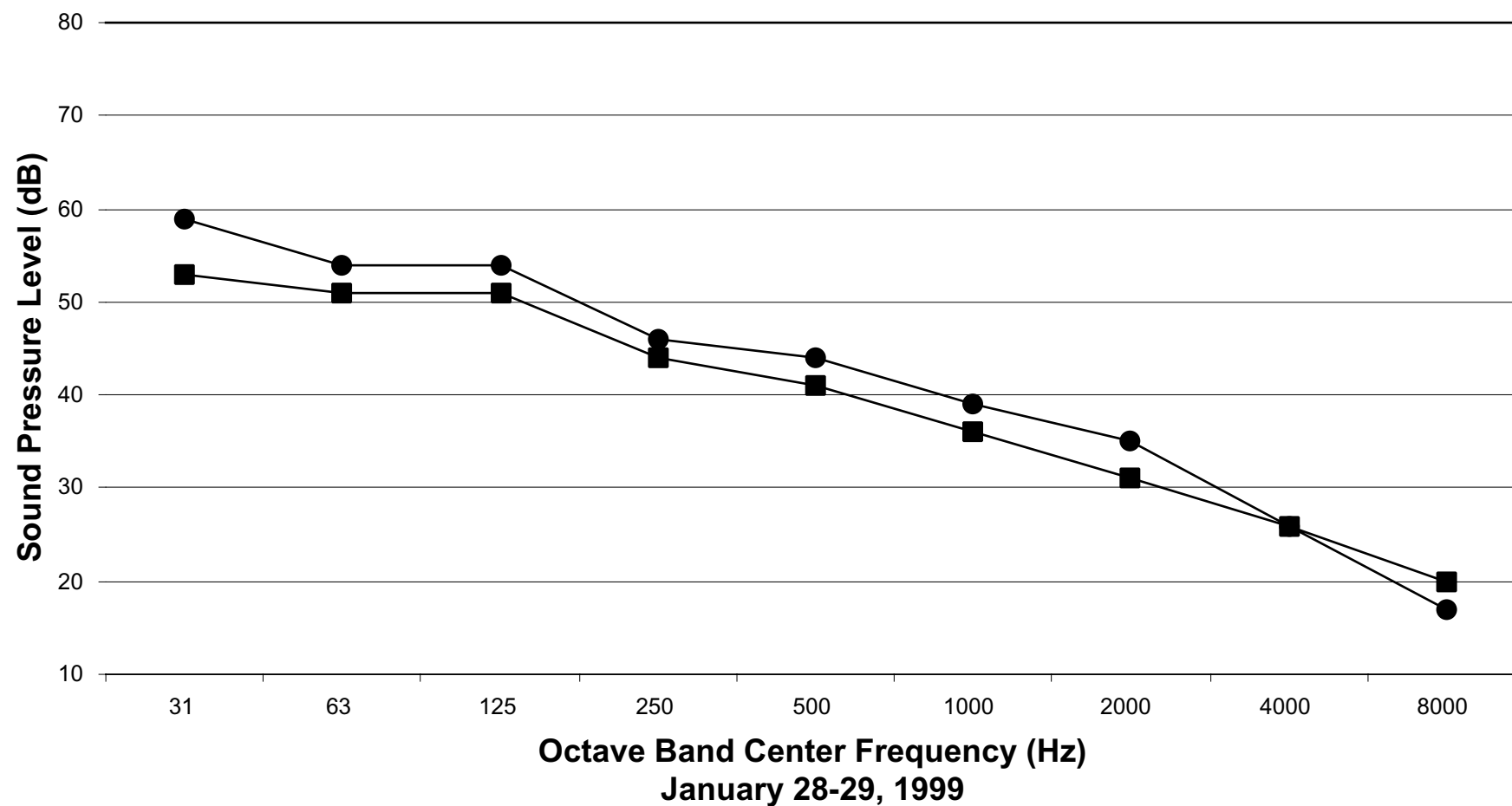
- DAYTIME
■ NIGHTTIME

**MEASURED OCTAVE BAND SOUND
PRESSURE LEVELS
LOCATION 2 - MORRO BAY HIGH SCHOOL**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-8

**LEGEND**

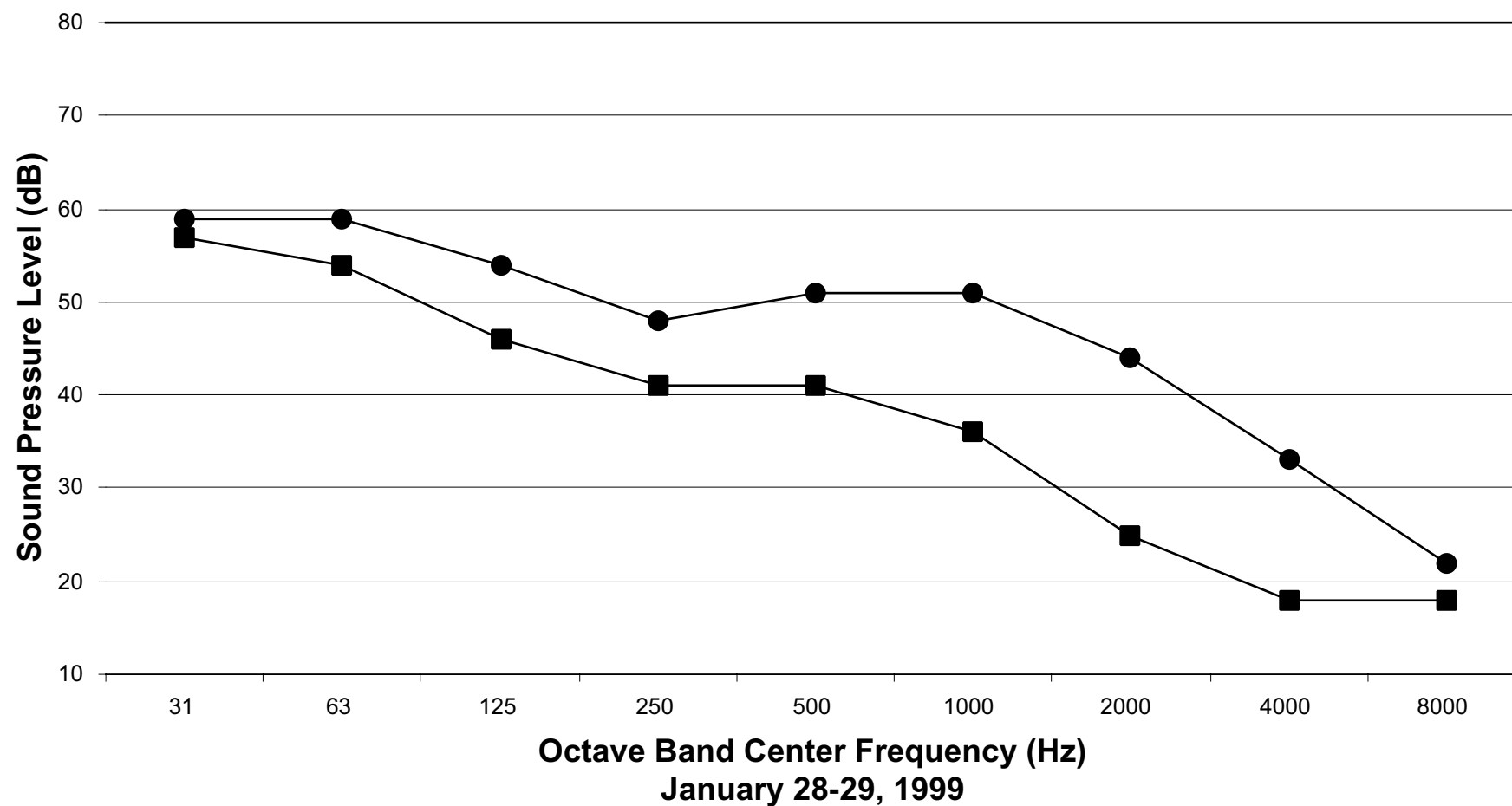
- DAYTIME
■ NIGHTTIME

**MEASURED OCTAVE BAND SOUND
PRESSURE LEVELS
LOCATION 3 - MORRO BAY ELEMENTARY
SCHOOL**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-9

**LEGEND**

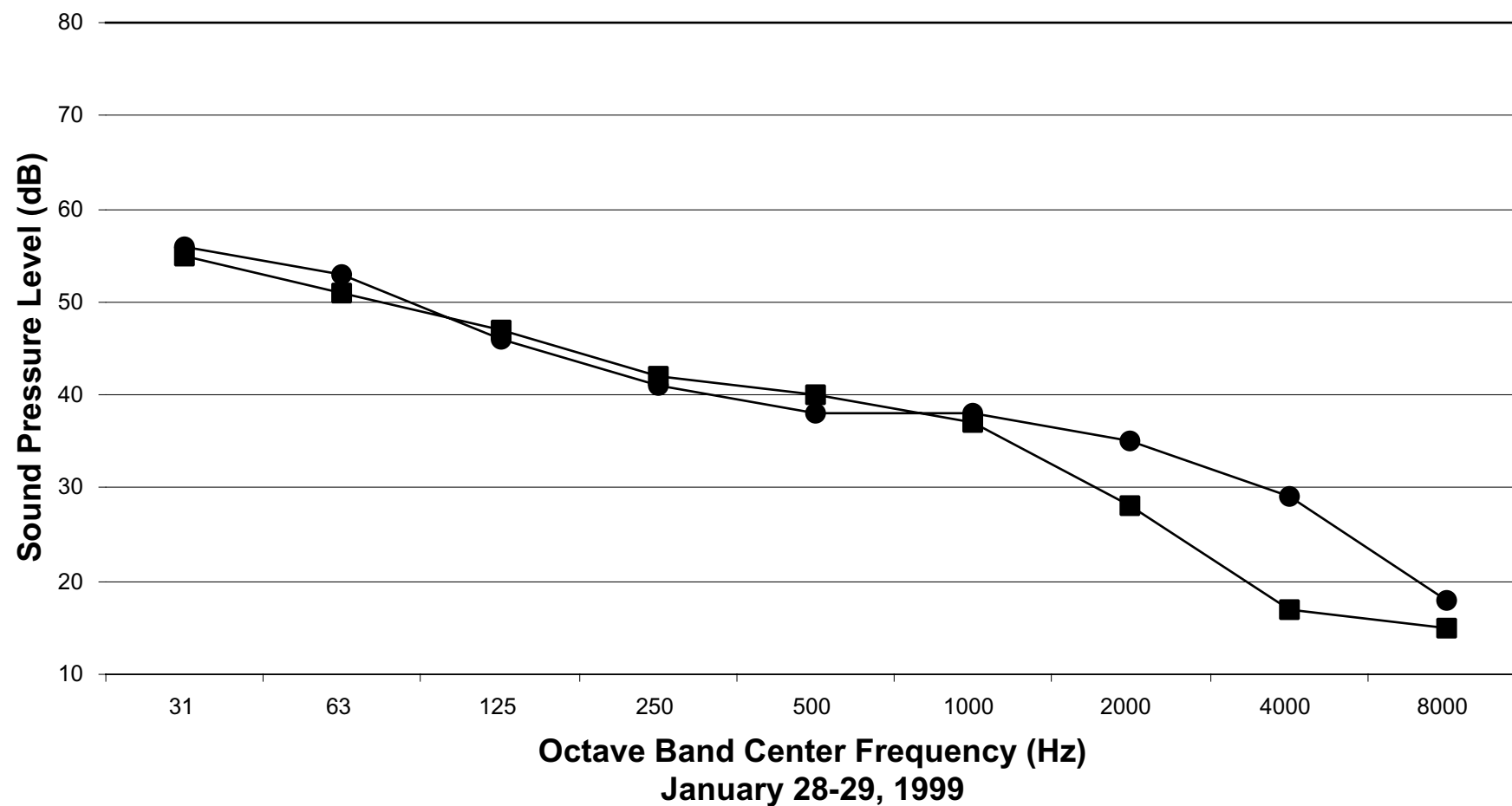
- DAYTIME
■ NIGHTTIME

**MEASURED OCTAVE BAND SOUND
PRESSURE LEVELS
LOCATION 4 - RADCLIFF STREET AND
BERWICK DRIVE**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-10

**LEGEND**

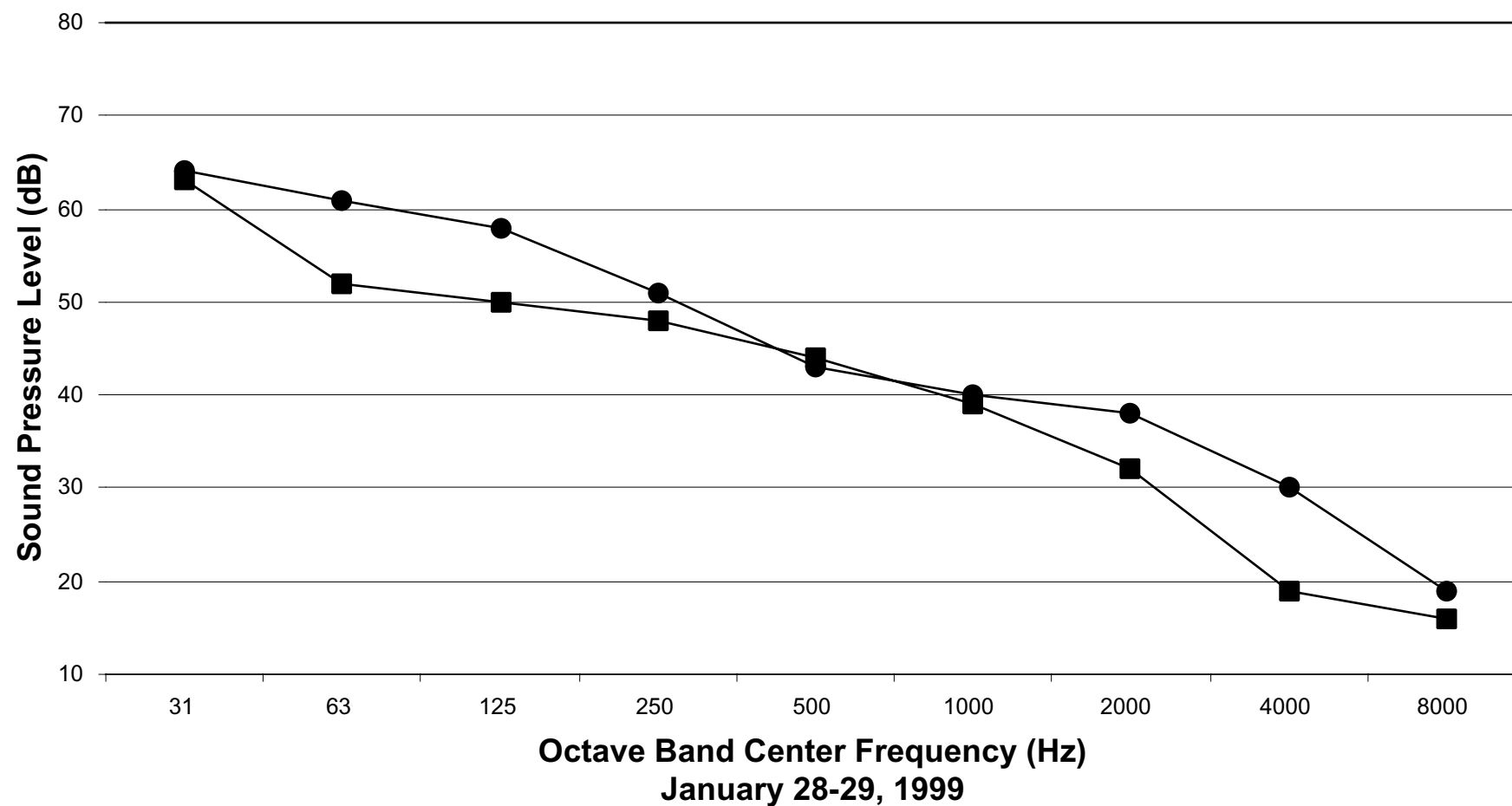
- DAYTIME
- NIGHTTIME

**MEASURED OCTAVE BAND SOUND
PRESSURE LEVELS
LOCATION 5 - MORRO DUNES TRAILER
PARK**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-11

**LEGEND**

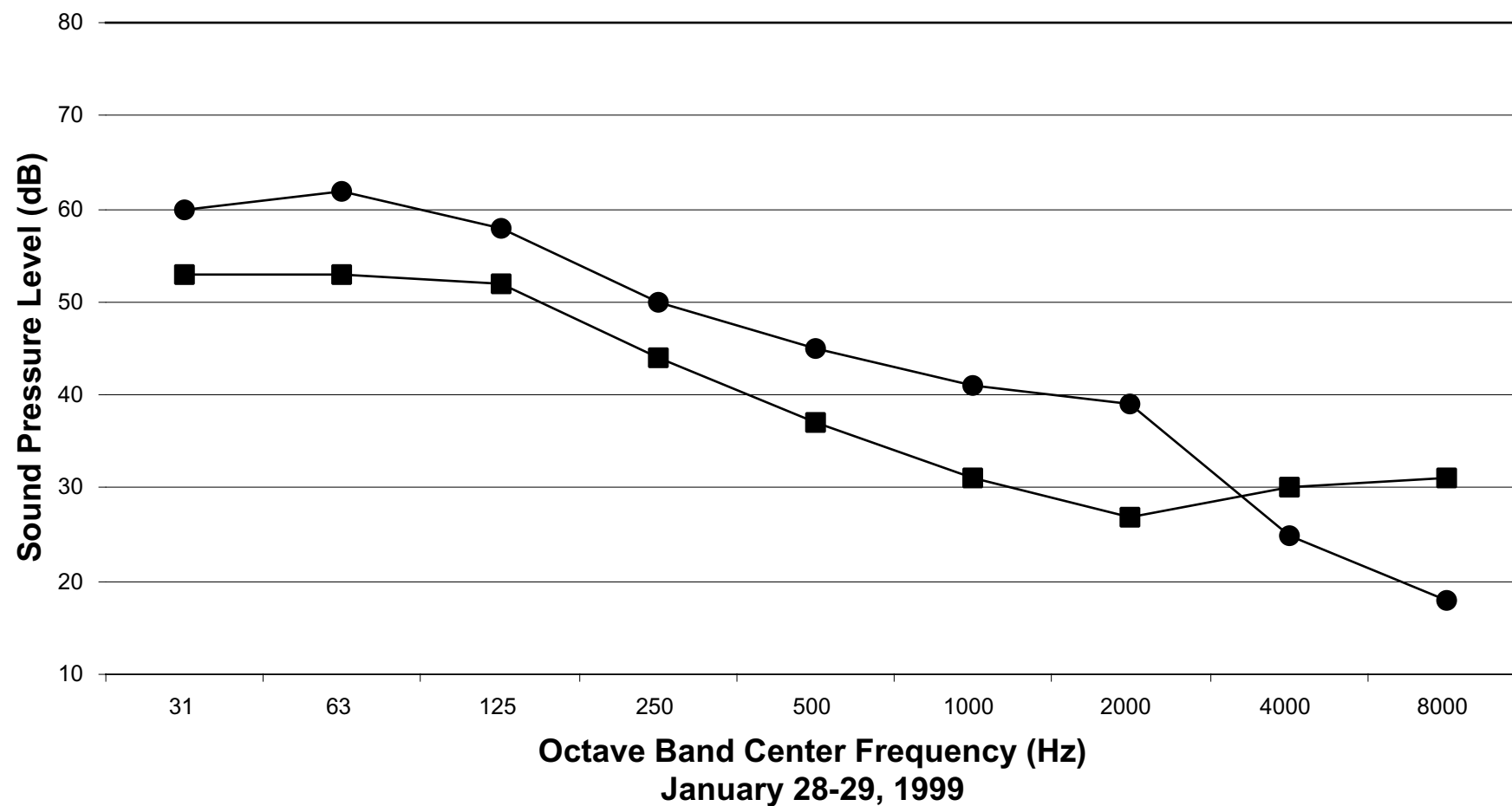
- DAYTIME
■ NIGHTTIME

**MEASURED OCTAVE BAND SOUND
PRESSURE LEVELS
LOCATION 6 - FIRST CHURCH OF CHRIST
SCIENTIST**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-12

**LEGEND**

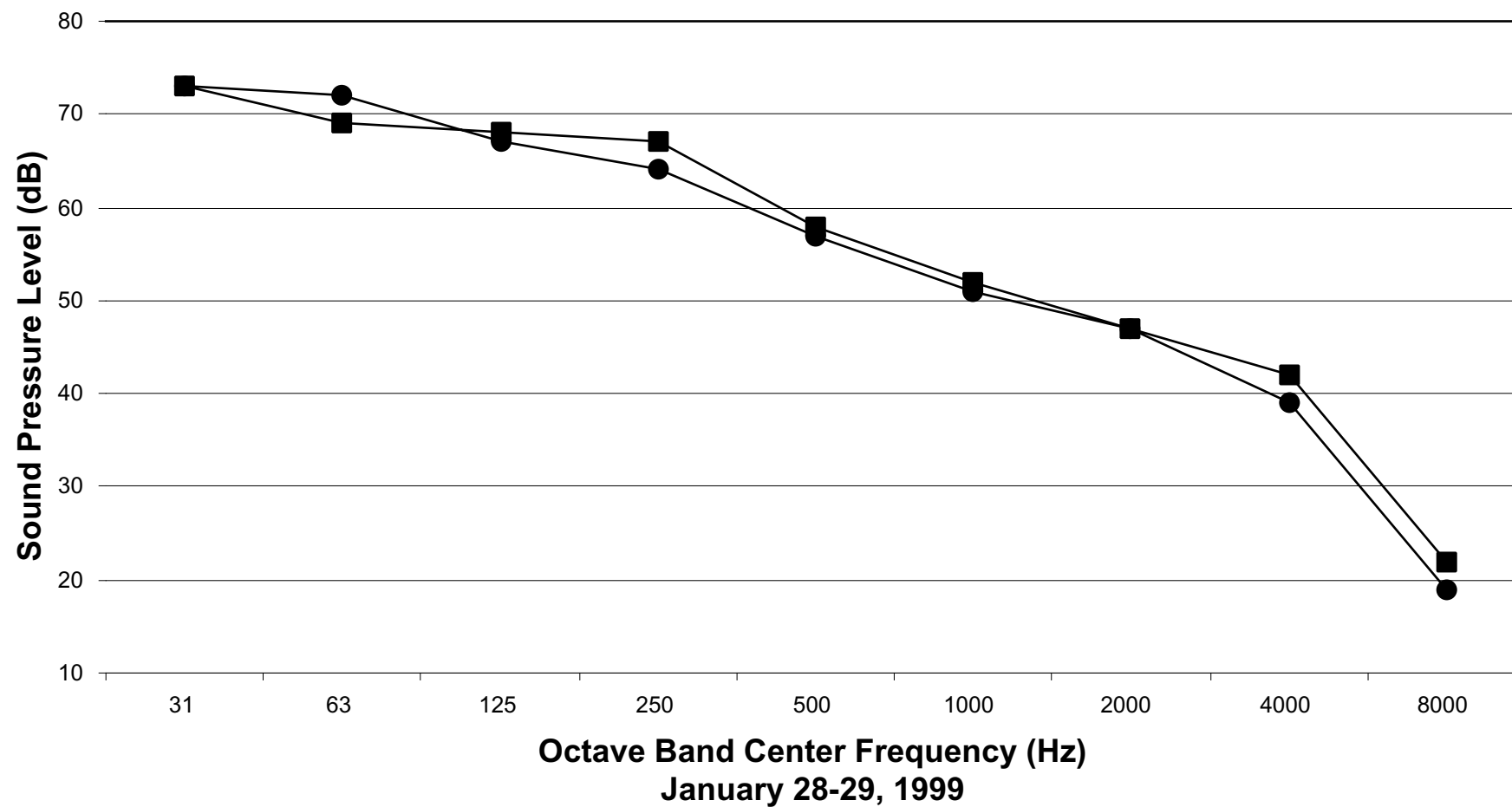
- DAYTIME
■ NIGHTTIME

**MEASURED OCTAVE BAND SOUND
PRESSURE LEVELS
LOCATION 7 - MORRO BAY LIBRARY**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-13

**LEGEND**

- DAYTIME
■ NIGHTTIME

**MEASURED OCTAVE BAND SOUND
PRESSURE LEVELS
LOCATION 8 - PLANT ENTRANCE**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-14

6.12.2.1 Construction Related Noise

This section reviews potential noise levels from the various stages of the Project. The construction process for Stage II (construction of the combined cycle units) generally creates noise during the following activities:

- Site Preparation
- Pile Installation
- Foundation Placement
- Building Construction
- Exterior Finish and Cleanup

Construction equipment will differ from phase to phase. In general, heavy equipment (e.g., bulldozers, dump trucks, and concrete mixers) is used during excavation and concrete pouring activities. Most other phases involve the delivery and assembly of the building components. Note that the plan is for most heavy construction to take place in 21 months, with the most intense period of activity occurring over an approximate 7 months period.

Noise levels of construction equipment typically utilized for this type of project are presented in Table 6.12-6. It is important to note that all the equipment presented is not used in each phase of construction. Further, equipment used is not generally operated continuously, nor is the equipment necessarily operated simultaneously. General site-average sound levels for each phase of construction (Bolt, Beranek and Newman, 1971) are presented in Table 6.12-7.

TABLE 6.12-6
NOISE LEVELS OF MAJOR CONSTRUCTION EQUIPMENT

EQUIPMENT TYPE	NOISE LEVEL (dBA)	
	50 Feet from the Source	2,000 Feet from the Source
Trucks	91	59
Crane	83	51
Roller	89	57
Bulldozers	80	48
Pickup Trucks	60	28
Backhoes	85	53
Jack Hammers	88	56
Rock Drills	98	66
Pneumatic Tools	86	54
Welder/Torch	78	46
Paving Breaker	82	50
Saws	78	46
Concrete Grinder	85	53

Source: Bolt, Beranek and Newman, 1971 (all except rock crusher)
Measured data reported in Gregory Canyon Landfill Noise Assessment (rock crusher)

TABLE 6.12-7
TYPICAL SITE AVERAGE NOISE LEVELS
BY CONSTRUCTION ACTIVITY (dBA)

ACTIVITY TYPE	NOISE LEVEL (dBA)	
	50 Feet from the Source	2,000 Feet from the Source
Site Clearing	84	52
Excavation	89	57
Pile Installation	95	63
Foundation	77	45
Building Construction	84	52
Finishing	89	57

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Source: Bolt, Beranek and Newman, 1971

The noise levels presented in Table 6.12-6 and Table 6.12-7 are for a distance of 50 feet from the source, but noise associated with the construction of the Project will be reduced by a variety of factors. The most significant of these is the reduction, or attenuation of the sound energy with distance. In general, this factor results in a 6 dB decrease in the sound level with every doubling of distance from the source. For example, the 84 dBA average sound level associated with site clearing (see Table 6.12-7) will be attenuated to 78 dBA at 100 feet, 72 dBA at 200 feet, and 66 dBA at 400 feet. As shown in Table 6.12-7, at 2,000 feet the sound level from site clearing will be attenuated to 52 dBA due to distance alone.

The noise-sensitive areas are located at various distances from where noise will be produced. As shown in Figure 6.12-2, with the exception of the Morro Dunes RV Park located north of Morro Creek, the receptor locations classified as noise-sensitive are all more than 2,000 feet from the construction area for the Project. The RV Park is about 1,000 feet from the Project construction area, but its residents are typically only in the area for short duration (one to two weeks) and natural sound levels from the ocean are often heard and help to mask the noise from plant areas. Other noise receptor locations that are of concern to the City include the tourist-related areas identified during the July 2000 ambient survey. Some of these locations are also closer than 2,000 feet from Project construction zones. For example, the Coleman Park location (Number 11) is approximately 1,200 to 1,300 feet from both the new equipment construction zone and the existing plant

demolition area. The Embarcadero location (Number 10) is approximately 1,400 feet from the new equipment construction zone, but within 300 to 500 feet of the existing plant demolition area.

The typical sound levels presented in Table 6.12-6 and Table 6.12-7 are those which will be experienced by people outdoors. A building provides significant attenuation for those who are indoors. Sound levels can be expected to be up to 27 dB lower inside the house or in an office building, especially with the windows closed. Even in homes with the windows open, indoor sound levels can be reduced by up to 17 dB (EPA, 1978).

Many questions were raised in public meetings in the Morro Bay area about noise. As a result, construction noise was further analyzed using a detailed preliminary construction equipment list and schedule, broken down by the aforementioned construction phases, that was provided by Duke/Fluor Daniel. For this more detailed analysis (see Appendix 6.12-1), the Project's construction site was divided into construction zones to organize the various activities for the noise analysis. Based upon experience with similar projects, it was assumed that 50 percent of the scheduled activities onsite each month were actually in operation. This assumption was followed for each phase of construction. The estimated construction noise levels at each Receptor during the heaviest periods of activity are summarized in Table 6.12-8.

As shown in Table 6.12-8, at Scott Avenue, the RV Park, and the Public Park, located at the intersection of Embarcadero and Coleman, construction noise would be as much as 4 dB above ambient noise levels during the busiest periods of construction activity. These increases may be perceptible, but are not considered significant based on the intermittent nature and short-term duration of the noise levels. Further, the RV Park and the Public Park are transient-use locations that typically do not involve extended uses. At Morro Rock, construction noise would be expected to be approximately 1 dB above daytime noise levels, which would not be audible and therefore, would not result in a significant noise impact. Construction noise at Morro Bay High School, the Embarcadero Area across from the power plant, and along the public beach shoreline would be lower than daytime ambient noise levels and would also not be considered significant.

The above noise levels and associated impacts include the use of a new quieter pile driving technique that will support the main equipment and building foundations. Standard pile installation involves impacting each pile with a large weight or hydraulic ram, much like using a hammer to pound a nail into wood. However, pile driving is quite noisy - typically ranging from 101 to 106 dBA at 50 feet from the source (CERL, 1978). Further, pile driving can be very annoying due to the repeated, pounding nature of the operation. This standard technique could be

TABLE 6.12-8
CONSTRUCTION NOISE LEVELS AT RECEPTOR LOCATIONS

RECEPTOR IDENTIFICATION	DESCRIPTION	APPROXIMATE DISTANCE TO CENTER OF CONSTRUCTION SITE (feet)	MEASURED DAYTIME AMBIENT SOUND LEVEL L_{eq} (dBA) ⁽³⁾	PREDICTED HIGHEST AGGREGATE CONSTRUCTION NOISE (dBA) ⁽³⁾	DIFFERENCE BETWEEN CONST. NOISE AND AMBIENT (dB)
1	Scott Avenue	2,350	50 ⁽²⁾	54	4
2	Morro Bay High School	2,100	60	50	-10
5	RV Park	700	60 ⁽³⁾	64	4
10	Embarcadero	1,400	67	63	-4
11	Public Park	1,350	56	60	4
12	Public Beach	1,600	62	52	-10
13	Morro Rock, E.	2,500	52	53	1

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- (1) Measured daytime ambient L_{eq} value from 1999 or 2000 field surveys, except as noted.
 (2) No measured data available. Ambient value is estimated from similar location(s).
 (3) Includes estimated benefit for ground attenuation and/or natural barrier effects.

Source: PCR Services Corporation, 2000

considered an adverse noise impact at many of the receptor locations. In response to public concerns about this activity raised at several public meetings, Duke Energy has chosen to use auger cast piles, which are more analogous to drilling a hole into a piece of wood and filling it with putty. Noise levels for auger cast piling are from 5 to 15 dB quieter than for standard driving techniques and do not include the annoying pounding, impact sounds. Instead, noise levels from auger cast piling are dominated by the engines of the auger and casting equipment, much akin to noise from trenching machines or cement trucks. The use of auger cast pile installation, over standard pile driving, will result in greatly-reduced annoyance for this phase of the construction process.

Throughout the Project, haul trucks will be bringing in building materials, construction supplies, and Project equipment, as well as removing demolition materials and construction scrap. These haul trucks have the potential to generate noise levels as high as 80 dBA at a distance of 50 feet from the traveled roadway segment. However, given a very conservative peak hourly truck volume of 25 vehicle trips (12 to 13 truck entering the site and then leaving again), and a vehicle speed of 25 mph, the worst-case hourly average noise level (L_{eq}) generated by haul trucks for this Project would be approximately 62 dBA at a distance of 50 feet from the source. As shown in Table 6.12-9, predicted levels at key locations are from 3 to 28 dB below the existing ambient L_{eq} values, even under these assumed worst-case conditions. Since the truck traffic noise levels would be less than ambient noise levels, they are considered as less than significant. Single-event pass-bys may be a source of annoyance, for outdoor receptors at the High School, the amusement facility, and, especially, the RV park occupants (even with the existing western boundary wall), but these temporary, single-event annoyances can be minimized by maintaining the proper speeds and limiting the use of engine brakes. Further, receptors on Atascadero Road presently experience truck noise each day due to the presence of a gravel operator and of the City's waste water treatment plant, so the annoyance factor should be reduced due to familiarity with this type of activity in the area.

Although the above construction aspects of the Project are the most notable regarding preoperations noise, the demolition of the existing site facilities, including (a) fuel oil storage tank removal (prior to the construction of the new combined cycle units) and (b) demolition of the existing stacks and power building (following the start-up of the new units) also deserved a noise impact analysis. The staged demolition of these two, distinct parts of the existing facility would not involve the use of explosives, but would, rather, be performed with a traditional, gradual building disassembly process. Specifically, the removal of the unused fuel oil tanks and their foundations would probably involve saw or torch cutting of the tank shells and paving breaking of the concrete bases. Further, the stacks are anticipated to be cut into several sections (starting at the top) and lifted off by a large crane.

TABLE 6.12-9
HAUL TRUCK TRAFFIC NOISE LEVELS AT RECEPTOR LOCATIONS

RECEPTOR IDENTIFICATION ⁽¹⁾	DESCRIPTION	MEASURED DAYTIME AMBIENT SOUND LEVEL (dBA)	PREDICTED HIGHEST HAUL TRUCK TRAFFIC NOISE LEVEL, L_{eq} (dBA) ⁽³⁾	DIFFERENCE BETWEEN TRUCK TRAFFIC HAUL NOISE AND AMBIENT (dB)
1	Scott Avenue	50 ⁽²⁾	26	-24
2	Morro Bay High School	60	39	-21
5	RV Park	60 ⁽²⁾	57	-3
10	Embarcadero	67	50	-17
11	Public Park	56	50	-6
12	Public Beach	62	34	-28
13	Morro Rock	52	28	-24

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- (1) Measured daytime ambient L_{eq} value from 1999 or 2000 field surveys, except as noted.
 (2) No measured data available. Ambient value is estimated from similar location(s).
 (3) Includes estimated benefit for ground attenuation and/or natural barrier effects.
 (4) Includes an estimated benefit from the existing western boundary wall at the RV park.

Source: PCR Services Corporation, 2000

The remaining building is anticipated to be demolished with standard knock-down techniques and pavement/foundation breaking equipment. The demolition process of the existing power building and stacks is expected to include combinations of cranes, dump trucks, backhoe loaders, concrete breakers, concrete grinder, bulldozers, and watering trucks. Because this portion of the Plant is located further south along Embarcadero, tourist areas such as the Salt Water Taffy which are located directly across from the Plant, as well as the residences along Scott Avenue could potentially experience higher noise levels from these demolition activities. However, these higher noise levels due to proximity would be offset by lower aggregate noise levels since demolition operations do not require as much heavy equipment as construction operations. Therefore, the existing plant demolition would be expected to generate overall noise levels that are comparable (depending on the particular receptor location) to the Project construction phases or less. The tankage demolition noise levels and power building/stack demolition noise levels are summarized in Tables 6.12-10 and 6.12-11, respectively.

TABLE 6.12-10
TANKAGE DEMOLITION NOISE LEVELS AT
RECEPTOR LOCATIONS

RECEPTOR IDENTIFICATION	DESCRIPTION	APPROXIMATELY DISTANCE TO CENTER OF DEMOLITION	MEASURED DAYTIME AMBIENT SOUND LEVEL L_{eq} (dBA) ⁽¹⁾	PREDICTED HIGHEST AGGREGATE TANK DEMOLITION NOISE LEVEL L_{eq} (dBA) ⁽³⁾	DIFFERENCE BETWEEN DEMOLITION NOISE AND AMBIENT (dBA)
1	Scott Avenue	2,350	50	49	-1
2	M. B. High School	2,100	60	45	-15
10	RV Park	700	60 ⁽²⁾	59	-1
11	Public Park	1,350	56	55	-1
12	Public Beach	1,600	62	47	-15
13	Morro Rock, E	2,500	52	48	-4

(1) Measured daytime ambient L_{eq} value from 1999 or 2000 field surveys, except as noted.

(2) No measured data available. Ambient value is estimated from similar location(s).

(3) Includes estimated benefit for ground attenuation and/or natural barrier effects.

Source: PRC Services Corporation, 2000.

TABLE 6.12-11
TANKAGE DEMOLITION NOISE LEVELS AT
RECEPTOR LOCATIONS

RECEPTOR IDENTIFICATION	DESCRIPTION	APPROXIMATELY DISTANCE TO CENTER OF DEMOLITION	MEASURED DAYTIME AMBIENT SOUND LEVEL L_{eq} (dBA) ⁽¹⁾	PREDICTED HIGHEST AGGREGATE POWERHOUSE AND STACK DEMOLITION NOISE LEVEL L_{eq} (dBA) ⁽³⁾	DIFFERENCE BETWEEN DEMOLITION NOISE AND AMBIENT (dBA)
1	Scott Avenue	1,200	50	54	4
2	M. B. High School	3,300	60	31	-29
5	RV Park	2,450	60 ⁽²⁾	38	-22
10	Embarcadero	500	67	72	5
11	Public Park	1,300	56	64	8
12	Public Beach	2,400	62	48	-14
13	Morro Rock, E	2,500	52	58	6

(1) Measured daytime ambient L_{eq} value from 1999 or 2000 field surveys, except as noted.

(2) No measured data available. Ambient value is estimated from similar location(s).

(3) Includes estimated benefit for ground attenuation and/or natural barrier effects.

Source: PRC Services Corporation, 2000.

Table 6.12-10 shows that the tank demolition is predicted to produce noise levels that are consistently less than the existing ambient environment at the most-effected receptor locations. Table 6.12-11 shows that power building and stacks demolition could yield noise levels at Scott Avenue that are 4 dB higher than the measured daytime ambient, while the Embarcadero, Morro Rock (east side), and the Public Park could be 5 to 8 dB above ambient noise levels during the busiest periods of construction activity. These daytime increases may be perceptible, but are not considered significant based on the relatively very short duration of these activities. Further, Coleman Park, the Embarcadero, and Morro Rock are transient-use locations that typically do not involve extended uses. Noise from demolition of the existing power building and stacks at Morro Bay High School, the RV Park, and the public beach area is expected to be so far below the existing daytime ambient environment so as to be inaudible and, again, would not be considered significant.

In summary, the Project-related construction activities and related operations will generate intermittent and, at some receptor locations, measurable noise levels. Because of the nature of construction/ demolition noise, some operations may be able to be heard at some of the most-affected receptor locations and could be a potential source of annoyance. However, these operations would not be expected to result in significant noise impacts, based on the fact that construction/demolition noise will be short-term and would be experienced intermittently and only temporarily during periods of heavy construction. During periods of reduced activity, lower noise levels would be expected. Due to the distances involved, demolition noise would not be significant at other sensitive receptor and tourist areas around the City (i.e. the MB Elementary School, the Library, the High School and areas northward, the Radcliff/Berwick areas, and the main commercial and residential districts of the City).

For the Project-related construction operations, haul truck traffic, and (existing plant) demolition, the short-term noise levels will not be significant due to the following factors:

- The distance separating the residential areas from the site will result in substantial attenuation of construction noise. As shown in Tables 6.12-6, 6.12-7, and 6.12-8, construction sound levels will often be below measured ambient levels (which are summarized in Tables 6.12-3, 6.12-4 and 6.12-5).
- The construction equipment will not normally be operating simultaneously.
- Rather than pile driving, auger cast pile installation techniques will be used.
- During construction, there will be periods of time when no equipment will be operating and the noise environment will simply be the existing ambient.
- Construction activities are scheduled to primarily occur during daytime hours. When nighttime shifts are used, activities that do not generate high noise levels will be planned.
- To reduce construction noise to the greatest extent possible and practical, functional mufflers will be installed and maintained on construction equipment.

6.12.2.2 Operations and Maintenance Related Noise

Upon commencement of commercial operation, future MBPP noise levels will reflect newly modernized conditions. Specifically, the quieter new combined cycle units with noise reduction upgrades developed by Duke Energy in connection with Duke Fluor Daniel will begin operation and the louder Units 1 through 4 will be dismantled (the stacks associated with these units will also

be taken down). Nevertheless, local residents have expressed concerns about future MBPP noise levels. In response to these concerns, Duke Energy has undertaken an extensive noise prediction study to identify and evaluate special design features which will be added to the Project to help control noise.

The modeling study used plant layout configurations and equipment information for the Project from Duke/Fluor Daniel (D/FD), an engineering and construction company that is performing front-end engineering in support of Duke Energy's application to the Commission. Specifically, the study focused on the potential noise generated by the proposed four trains of Gas-Fired Combustion Turbines (General Electric Frame 7FA's), four HRSG's, two trains of Steam Turbine Generators (STG's) with steam condensers, large water pumps, and six main power transformers. The details and incremental results of the modeling process are discussed in Appendix 6.12-1.

The new combined cycle units were modeled as partially-enclosed units. That is, the gas turbines and steam turbines are currently planned to be inside individual buildings (a total of six structures). These buildings are to serve as aesthetic features for the Project, but they will also provide acoustical benefits in substantially-containing the turbine, generator, and related equipment noise. These buildings were modeled as both noise sources (noise radiation from the walls) and as barriers. The berms at the north plant boundary and next to the Peregrine Building were also included as barriers, as were major equipment structures (such as the HRSG trains). To be conservative, however, excess attenuation due to vegetation (e.g., trees and ground cover) or partial shielding from intervening buildings and other man-made barriers throughout the City were not used. Another element of conservatism, which is standard practice in the description of environmental noise, is that stable atmospheric conditions were assumed (suitable for reproducible measurements) that are favorable for noise to travel greater distances. These inherent conservative factors and assumptions result in a noise model that will tend to be biased to higher predicted values than will be expected in the actual environment around MBPP.

All continuous-operation equipment items that were deemed to be significant Project-related noise sources were included in the baseline noise model. The set of modeled sources included turbines (gas and steam in the power block), steam generator, pumps, motors, main transformers, and an

instrument air compressor. Only the currently-planned 'four-on-two' (gas turbine/steam turbine) power generation train set was modeled. Items that were considered as insignificant sources, such as pumps less than 20 horsepower, were excluded from the analysis. Also excluded were the offsite main cooling water pumps that will be inside the seawater intake structure (at the shoreline).

Rather than use estimated source input levels that can be calculated from accepted industry references⁽¹⁾, the modeling inputs used noise emission values that were obtained from equipment vendors on several recent D/FD design efforts that are also for Duke Energy and that use very similar Frame 7FA-based plant configurations. This use of vendor-supplied noise level information for the specific Project-related equipment for the MBPP means that the modeling has a higher level of accuracy, as compared to modeling done with generic information for the power plant equipment.

The modeling study was based on the conservative scenario that the new units could operate at maximum loads for an entire 24-hour period. This scenario is conservative because electricity demand normally ramps downward at night when commercial activities decline and when residential usage decreases (as people turn off lights, televisions, and appliances before going to sleep). The modeling was nevertheless performed assuming 24 hours of maximum loads to assure that even under this unusual condition, the Project will comply with Commission noise control requirements and City of Morro Bay Noise Element requirements at all hours of the day and night.

The modeling effort was repeated in an iterative fashion to analyze increasingly quiet configurations of plant equipment until a plant design was arrived at that resulted in compliance with both the City's Noise Element and the Commission's significant impact threshold. The modeling process, iterative steps, and incremental results are detailed in Appendix 6-12.1.

These compliant noise levels were achieved through the use of the following extensive and exhaustive array of mitigation measures:

- Selecting an effective plant layout for noise control concerns.
- Low-noise main transformers.
- Extensive baffles on the HRSG exhaust ducts.
- A shroud enclosure around the transition between the GTG Exhaust Duct and the HRSG Inlet.
- Noise control wall plate design on the HRSG casing walls.
- Low-noise steam system vents, tanks, and piping on the HRSG penthouse.

⁽¹⁾ Such as the Edison Electric Institute Technical Report, "Electric Power Plant Environmental Noise Guide"

- Low-noise Boiler Feedwater Pump Trains (low-noise motors and noise control blanketing on the pumps).
- Enclosing as much noisy equipment as practical within the Turbine Buildings.
- Acoustical properties on all GTG and STG Turbine Building elements (above and beyond a typical industrial building for this climate zone), including acoustical wall panel construction, ventilation silencers, noise control doors, and quiet HVAC equipment.
- Keeping the existing berms as sound barriers.
- Adding a 20-foot sound wall along the northern most boundary of the site area (just above Fisherman's Storage area).

Compliance with each standard is discussed briefly below.

California Energy Commission (CEC) Requirement (+5 dB criterion)

The Commission has determined that a significant noise impact may occur if noise from a new facility increases existing late night L_{90} noise levels by 5 or more dB at nearby residential areas (Baker, 1999). The results of the modeling described above as it relates to the Commission criterion are presented in Table 6.12-12. As this table indicates, noise increases will be less than 5 dB at surrounding residential locations. The Project will therefore not cause a significant noise impact and is in compliance with the Commission's impact threshold criterion.

City of Morro Bay Noise Element

The City of Morro Bay Noise Element's recommended noise levels for stationary sources are presented in Section 6.12.1.1.2. Daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) standards are shown for stationary sources. The standards must be met at the receiving land use property boundary. Results of the modeling described above as they relate to the City of Morro Bay Noise Element are presented in Table 6.12-13. As this table indicates, Noise Element standards are met at surrounding sensitive land uses. As a result, the Project will comply with the City of Morro Bay Noise Element.

TABLE 6.12-12

CALIFORNIA ENERGY COMMISSION SIGNIFICANCE CRITERION ANALYSIS
(Limit = Late-night ambient L₉₀ + 5 dB)

LOCATION (1)	DESCRIPTION (2)	EXISTING NIGHTTIME RESIDUAL AMBIENT NOISE (L ₉₀), dBA (with Units 1 through 4 at Various Loads) (3)	EXISTING NIGHTTIME RESIDUAL AMBIENT NOISE (L ₉₀) dBA (with Units 1 and 2 off and Units 3 and 4 on Standby) (4)	CEC EFFECTIVE PLANT ALLOWABLE (5) = [4] + 5 dB	PREDICTED MBPP NOISE CONTRIBUTIONS (Noise Control Case 4) (6)	TOTAL FUTURE NOISE ENVIRONMENT (New Plant Plus Nighttime Ambient), dBA (7) = [4] + [6]	DIFFERENCE BETWEEN FUTURE NOISE ENVIRONMENT AND CEC SIGNIFICANCE THRESHOLD, dB (8) = [5] - [7]
1	Scott Avenue	48 @ 80%	41	46	41	44	2 dB under limit
2	Morro Bay High School	45 @ 80%	42	47	36	43	4 dB under limit
3	Morro Bay Elementary School	45 @ 70%	42	47	35	43	4 dB under limit
4	Radcliff & Berwick	49 @ 60%	42	47	37	43	4 dB under limit
5	RV Park	42 @ 40%	40	45	43	45	at limit
6	First Church	43 @ 10%	43	48	38	44	4 dB under limit
7	Morro Bay Public Library	42 @ 10%	40	45	33	43	5 dB under limit
8	Olive & Piney	38 @ 10%	36	41	31	37	4 dB under limit

98-710/Rpts/AFC(text)/TbIs/Sec 6 (10/21/00/rm)

Source: PCR Services Corporation, 2000

TABLE 6.12-13

CITY OF MORRO BAY NOISE ELEMENT CRITERION ANALYSIS
(Limit = Nighttime Hourly L_{eq} of 45 dBA [total noise exposure at receiving land use property line])

LOCATION (1)	DESCRIPTION (2)	MORRO BAY NOISE ELEMENT ALLOWABLE LIMIT (total sound), Hourly L_{eq} dBA (3)	EXISTING NIGHTTIME RESIDUAL AMBIENT NOISE (L_{90}) dBA* (4)	PREDICTED MBPP NOISE CONTRIBUTIONS (Noise Control Case 4) (5)	TOTAL FUTURE NOISE ENVIRONMENT (New Plant Plus Nighttime Ambient), dBA (6) = [4] + [5]	DIFFERENCE BETWEEN FUTURE NOISE ENVIRONMENT AND MB NOISE ELEMENT LIMIT, dB (7) = [3] - [6]
1	Scott Avenue	45	41	41	44	1 dB under limit
2	Morro Bay High School	45	42	36	43	2 dB under limit
3	Morro Bay Elementary School	45	42	35	43	2 dB under limit
4	Radcliff & Berwick	45	42	37	43	2 dB under limit
5	RV Park	45	40	43	45	at limit
6	First Church	45	43	38	44	1 dB under limit
7	Morro Bay Public Library	45	40	33	40	5 dB under limit
8	Olive & Piney	45	36	31	37	8 dB under limit

98-710/Rpts/AFC(text)TbIs/Sec 6 (10/21/00/rm)

* Existing Units 1 and 2 off and Units 3 and 4 on standby at 10 percent loading.

Source: PCR Services Corporation, 2000

The compliant conditions are graphically given in Figures 6.12-15 and 6.12-16, which show the predicted noise level contours for the plant site and for the surrounding city areas, respectively.

In summary, as the Project complies with the City of Morro Bay Noise Element and the Commission's guidelines, it is concluded that there are no residences, hospitals, libraries, schools, places of worship or other facilities where quiet is an important attribute of the environment where there is a potential increase of 5 dB or more from the Project over existing background levels.

These results are attributable to noise control improvements resulting from the Project. The new combined cycle units are state-of-the-art and the new units are much quieter than Units 1 through 4, which they are replacing. This will yield daytime noise levels that are the same or lower at all locations around the City of Morro Bay. Further, nighttime noise levels, even under full power loading, will be comparable to existing low-load/stand-by conditions and will have the added benefit of being less intrusive or annoying, given the reduced discrete tones (i.e. 'whine' or 'hum') from the new equipment.

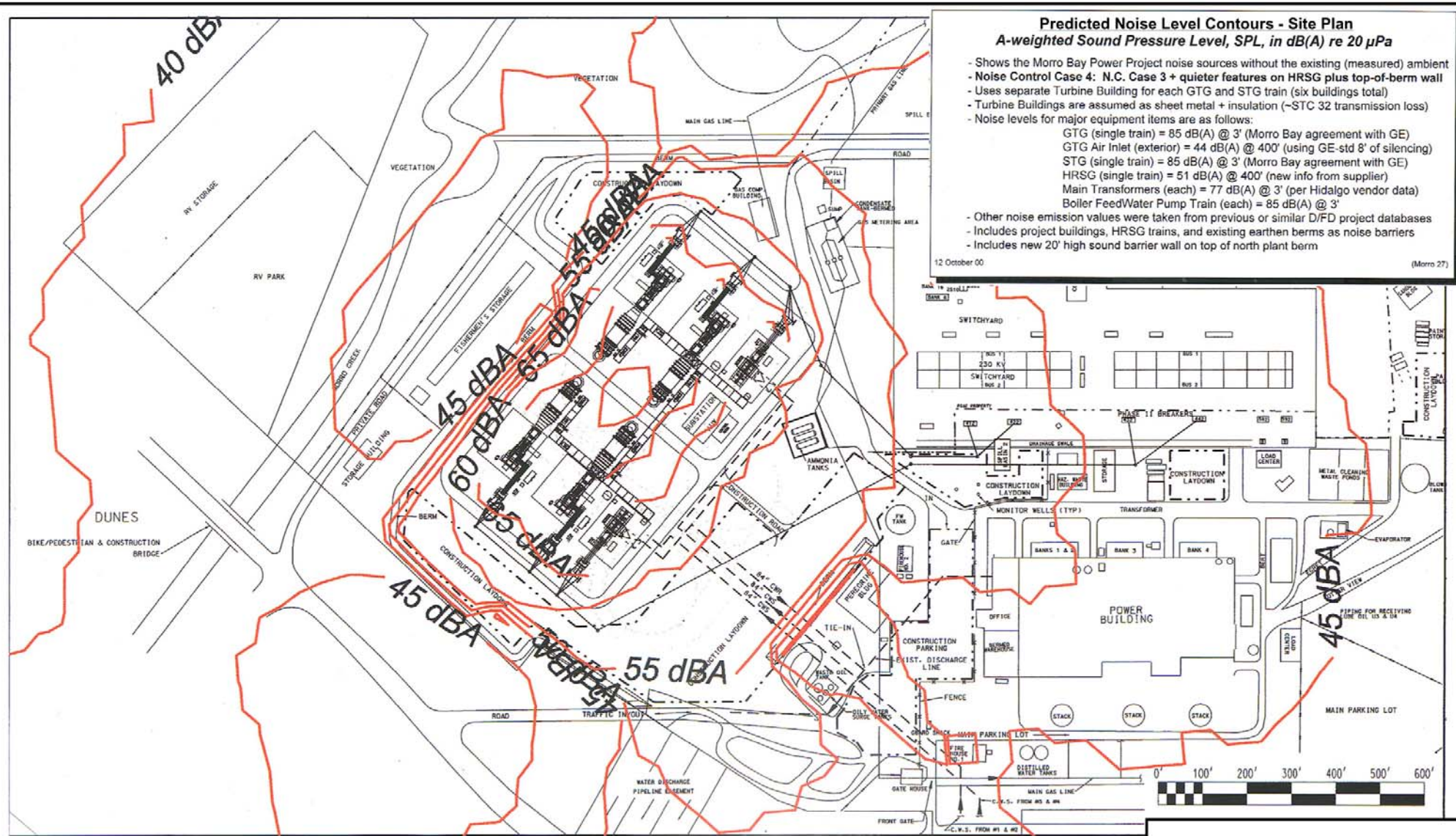
This improvement in noise condition will occur while allowing power generation capabilities to increase at MBPP, thereby creating greater stability in the California power grid and less chance of power outages in City of Morro Bay or throughout central California.

Onsite Noise Levels

Onsite management of noise is governed by Federal OSHA/Cal-OSHA. Modeling for the new units indicates that, at close range, noise levels of 85 dBA or greater may be experienced by on-site plant operations personnel. Cal-OSHA requires hearing protection for workers exposed to noise levels greater than 85 dBA for extended periods. These types of protection are currently addressed with onsite health and safety training. In addition, OSHA/Cal-OSHA requires periodic monitoring of onsite noise levels to determine/confirm noise protection requirements and safety conditions. No health problems attributable to noise have been reported to MBPP Health and Safety personnel. Health and Safety training will continue after implementation of the Project (see Section 6.17 - Worker Safety). Consequently, onsite impacts to employees from the Project will not be significant.

Audible Switchyard/Transmission Line Noise Levels

The Project will not add any new transmission lines or modify the existing PG&E Morro Bay switchyard. Further, the increase in onsite power generating capability ([198] MW net increase) does not change audible switchyard/transmission line noise levels. During operation, the existing

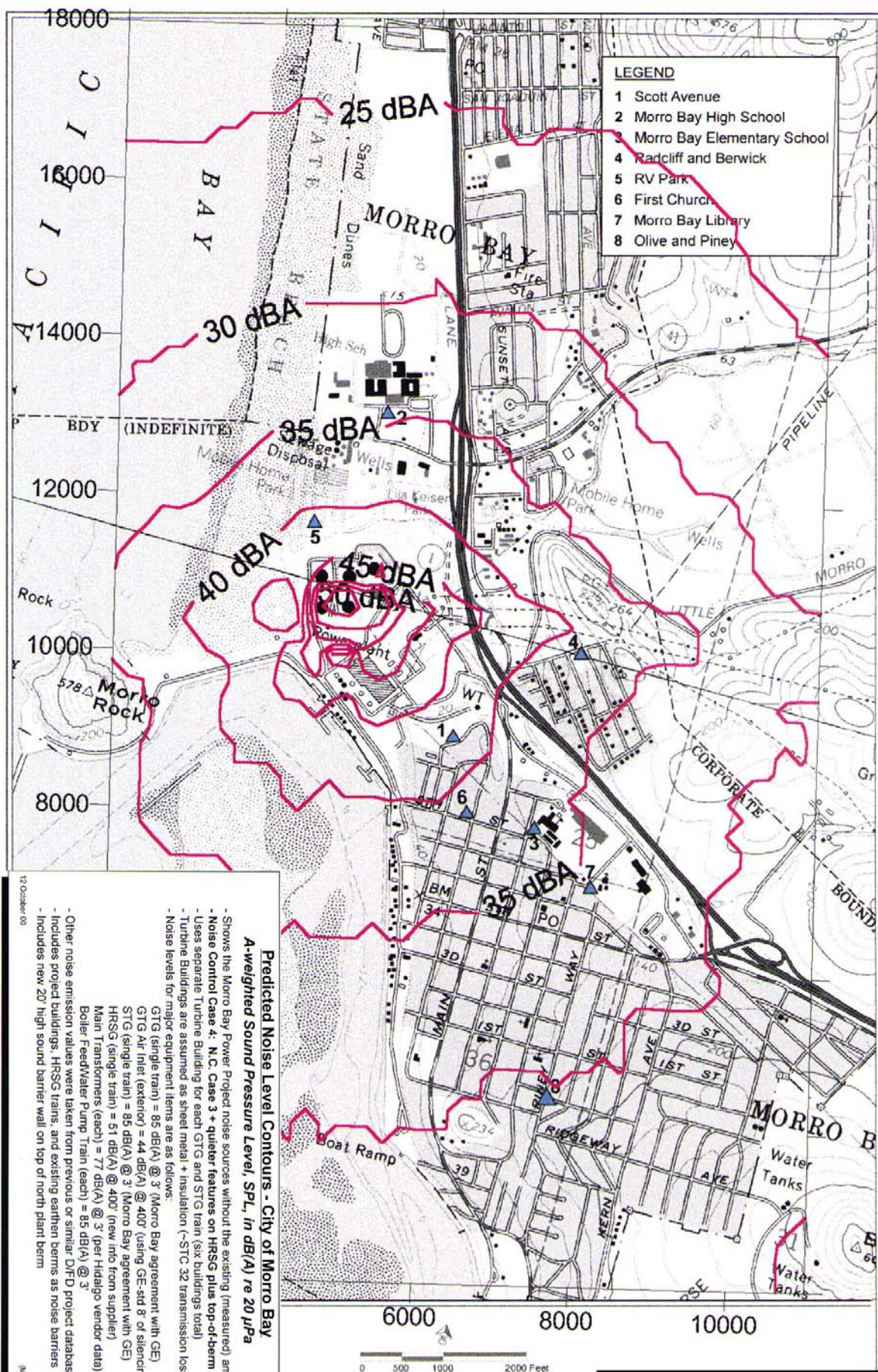


**PREDICTED
NOISE LEVEL CONTOURS - SITE PLAN**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-15



PREDICTED NOISE LEVEL CONTOURS - CITY OF MORRO BAY

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

TRC

FIGURE 6.12-16

transmission line will emit a corona or hum which is somewhat audible immediately beneath the line and slightly audible for up to approximately 100 feet on either side of the line. This level of noise will not have a significant impact on the surrounding environment because the nearest residences are located more than 100 feet away from the line. The PG&E Morro Bay switchyard (located behind the main existing MBPP building) also emits a low level of noise. However, the switchyard is also located far enough away from local residents that it is not expected to generate noise that will be significant.

Tourist-Related Areas

Questions were raised at public meetings about potential noise impacts of the new MBPP at nearby tourist-related areas. The Project site has several adjacent or nearby areas that are important to the tourist and visitor industry for the City. Modeling at several of these areas were performed in response to public concerns. These areas include the Morro Rock visitor area, the Public Park at the intersection of Embarcadero and Coleman, the beach and shoreline (east of Morro Rock), and the north end of the Embarcadero area (across the street from the plant entrance). Receptors number 10 through 14 on all of the noise tables in this section correspond to these special-focus, tourist-related areas.

Replacement of the existing Units 1 through 4 with the Project will significantly reduce the noise levels in the tourist-related areas around the site. This is due to several reasons. First, the Project noise sources will generally be farther away from the Morro Rock, Coleman Park, and the Embarcadero areas (as compared to the existing plant's noise sources). This increased distance will provide more attenuation (natural reduction in sound levels that occurs with distance) for Project sources, relative to the existing plant. Second, much of the Project noise sources will be partially or totally shielded from tourist areas by the berms along the site's western and northern edges. This will reduce Project-related noise levels from 5 to 20 dB at many of the tourist areas studied. Third, the new combined cycle units will, as a whole, be significantly quieter than the existing plant equipment, since the Project will utilize current-technology processes and equipment that are significantly quieter than the existing sources.

The extent of the Project's reduced noise levels at nearby tourist-related areas relative to the current conditions with the existing power plant are summarized in Table 6.12-14, which compares the measured ambient level (from the July 2000 ambient survey) to the predicted Project contributions. As indicated, today the Embarcadero area experiences sound levels, both day and night, of around 67 dBA. This is compared to a predicted Project contribution of approximately 44 dBA, a 23 dB drop in noise levels. At the Park, existing levels are between 55 and 57 dBA, while the future

TABLE 6.12-14

COMPARISON OF EXISTING AND FUTURE NOISE LEVELS

AT MORRO BAY TOURIST AREAS

RECEPTOR		TIME OF DAY	MEASURED AMBIENT NOISE LEVEL, L _{EQ} DB(A) [JULY 2000]	PREDICTED PROJECT NOISE LEVEL CONTRIBUTION DB(A)	PREDICTED PROJECT CONTRIBUTION COMPARED TO MEASURED EXISTING AMBIENT
Label	Description				
10	Embarcadero ⁽¹⁾	00:03 (nighttime, middle)	67.3	44	23 dB under existing
		10:40 (daytime, middle)	66.6		
11	Coleman Park ⁽²⁾	17:23 (daytime, late)	54.6	46	9 dB under existing
		23:41 (nighttime, middle)	56.9		
12	Beach Shoreline ⁽³⁾	23:16 (nighttime, middle)	61.9	42	20 dB under existing
		11:02 (daytime, middle)	62.1		
13	Morro Rock, East ⁽⁴⁾	22:33 (nighttime, middle)	50.7	36	14 dB under existing
		03:30 (nighttime, late)	49.8		
		12:24 (daytime, middle)	54.3		
14	Morro Rock, West ⁽⁵⁾	17:53 (daytime, late)	59.3	<20	>35 dB under existing
		22:02 (nighttime, middle)	54.5		
		03:01 (nighttime, late)	51.9		
		11:59 (daytime, middle)	54.0		

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1. Location at Salt Water Taffy Shop, 1247 Embarcadero, directly across street from (existing) Center Stack
2. Location at Park at corner of Embarcadero and Coleman, near park bench area, northwest of swings
3. Location at shoreline, just south of the creek outlet wash area
4. Location at bend in Morro Rock access road, at west end of parking area
5. Location at end of Morro Rock access road, northeast of breakwater

Source: PCR Services Corporation, 2000

conditions with the Project are predicted to also be approximately 46 dBA. Existing shoreline levels are 62 dBA at night and during the day, whereas the Project's noise at this location will be inaudible as the plant's contribution here is expected to be approximately 42 dBA or less. At the east side of Morro Rock, existing noise levels are 54 dBA during the day and 50 dBA at night, but the future plant levels are predicted to be approximately 36 dBA. Likewise, the west side of Morro Rock currently experiences 52 to 54 dBA and the Project contributions will be less than 20 dBA. Thus, at the studied tourist-related areas, the future predicted noise levels from the Project are from 9 to greater than 30 dB below both the daytime and nighttime ambient levels.

In summary, due to the distances involved, the on-site berms, and the inherently quieter Project, the future conditions in tourist areas are expected to be well below the existing noise environment, even into the late night. Therefore, the Project's sound contributions at adjacent tourist areas are considered less than significant.

6.12.2.3 Additional Considerations

Steam Discharges

Of concern to the City's planning staff are noise emissions from occasional steam discharges and other pressurized venting. These discharge and venting episodes can be separated into three categories, based on noise emission amplitudes as well as frequency of occurrence:

(1) Commissioning and Initial Start-up Phase; (2) Normal Operations; and (3) Unusual or Emergency Events. A brief discussion of these types of steam discharges and their associated noise impacts follows, while a more detailed presentation can be found in Appendix 6.12-1.

- (1) For the Commissioning and Initial Start-up Phase, the vast majority of discharges and ventings are related to line cleaning of the process piping to remove foreign objects, welding slag, dirt, and other debris that may have found its way into the piping during plant construction. This line cleaning is most often done using pressurized steam. Although commissioning and initial start-up only lasts a few weeks between the end of construction and the beginning of long-term, normal operations and although line-cleaning venting only occurs during this relatively short-lived phase of a plant's life cycle, the frequency, length, and noise intensity of discharges and ventings can be significant. Therefore, temporary vent silencers are often used during this period to reduce the discharge noise levels.

In addition to the above planned and controlled line cleaning discharges, the Commissioning and Initial Start-up Phase can also include steam releases from a 'trip'⁽²⁾ of a Gas Turbine (GTG), Steam Turbine (STG), or HRSG train. The frequency, duration, and magnitude of these tripping discharges is highly variable, depending on the particular plant conditions at the time. Since these trip-related discharges occur primarily during the few weeks of the initial start-up phase, these discharge vents are not typically silenced due to the relatively short-lived usage. A specialized 'tripping' discharge is due to emergency pressure safety valve (PSV) discharges. PSV vents are almost never silenced since their operation is critical to protecting the plant and a silencer may hamper the proper operation of the safety valve. Thus, for safety concerns of the plant and all on-site personnel, PSV vent discharges are not silenced. These trip-related and PSV vents can produce high noise levels at the discharge point. Although these source levels would carry into the community such that outdoor receptors within approximately 3,000 feet of the plant could experience clearly audible noise levels, the trip-related and PSV discharges are of relatively infrequent occurrence and of relatively short duration. Given the infrequency and short duration of these discharges, the increases in ambient community noise levels would result in adverse but less than significant impacts.

To summarize, typical commissioning and initial start-up activities and related operations will generate significant, but intermittent noise levels. Some of these discharges (steam blow line cleaning), given their continuous or near-continuous duration, are typically silenced to reduce the noise in the community to insignificant levels. However, because of the nature of this phase, other venting operations (trips and PSV discharges) may be quite discernible and could be a potential source of annoyance. These potential annoyances would be short-term and, thus, would be experienced intermittently and only temporarily during Commissioning and Initial Start-up and are, therefore, not expected to result in significant impacts, based on the criteria thresholds.

- (2) For the Normal Operations Phase, which will extend from the Commissioning Phase through the end of the design life of the Project, planned steam vent discharges will be limited to controlled start-ups of the one or more GTG/STG/HRSG trains. The frequency of these controlled start-ups cannot be determined at this time since they are based on the future load requirements and system demands of the central California power grid. As with the Commissioning and Initial Start-up Phase, these venting sources may be discernible and a potential source of annoyance in the adjacent community, but they are not expected to produce

⁽²⁾ A 'trip' is the shut-down of a system due to an undesirable configuration or condition.

levels at receptors that are in excess of the standards established in the Morro Bay Noise Element. Further, they would be experienced only intermittently and temporarily and are, therefore, not considered as significant impacts.

- (3) Unusual or Emergency Events during the long-term Normal Operations Phase of the Project, would take the form of unplanned 'trips' of a train or as an emergency pressure relief event; both of which were discussed above. Unlike the Commissioning and Initial Start-up Phase, once a plant is successfully commissioned and begins its normal 30+ year life-cycle, the frequency of trips or PSV discharges is very low. As previously mentioned, these discharge events, although quite rare, may be quite discernible and could be a potential source of annoyance. These unplanned events may result in potential annoyances that would be short-term, temporary, and very infrequent during the Normal Operations Phase. Given the infrequency of the expected occurrence of these noise conditions, the noise impacts are not considered significant.

In conclusion, for steam discharges and ventings during (1) the Commissioning and Initial Start-up Phase; (2) the Normal Operations Phase; and (3) Unusual or Emergency Events, noise levels at the discharge points can be quite high. Some of these discharges are typically silenced to reduce the noise in the community to insignificant levels. However, other venting operations are not silenced for practicality or operational safety reasons. This can result in steam discharge noise emissions that may be quite discernible and could be a potential source of annoyance at large distances from the plant. In general, these potential annoyances would be short-term, intermittent, and temporary and are, therefore, not considered to result in significant impacts.

Meteorological Conditions

Also of concern to the City's planning staff are noise emissions from the Project during nonstandard weather conditions such as wind gradients, temperature gradients, inversions, stability and turbulence effects, and other atmospheric conditions. Indeed, at distances greater than about 100 m (330 feet) from the noise source, the movement of sound in an open environment can be significantly influenced by one or more atmospheric conditions. More often than not, noise levels reduce with distance under most types of weather conditions, but in some cases noise levels can actually increase at certain receptor locations. The increase can be due to several factors which are discussed in detail in Appendix 6.12-1.

To summarize the analysis of meteorological effects, the factors which influence the transmission of sound through the atmosphere are many, varied, and complex (often being inter-related). The bending of sound waves (i.e. refraction) is the most pronounced meteorological effect. However, nonuniform refraction can cause sizable deviations in predicted propagation mechanisms. As the path length increases, the less certain the predictive calculations become (Porges) and it becomes more problematic to try to produce a quantitative assessment of long-range noise propagation over complex terrain. In general, there will be times and conditions that will result in diminished, as well as in enhanced, long-range noise propagation to several receptor areas around the site. These better or worse situation are, however, expected, on average, to cancel out and yield community noise levels close to the predictions given in the previous contour maps.

6.12.2.4 Cumulative Effects

There are no noise sources in the Morro Bay area that will contribute to MBPP noise levels in a manner that would result in a cumulative impact (see Section 6.1). The most prevalent noise in the area is from Highway 1. This source, together with traffic on local streets and surf noise, actually helps to considerably mask MBPP noise at most locations during the day. Even at night, Highway 1, though operating at reduced traffic levels, still influences perceptible noise levels from MBPP, especially in the hillside area across the Highway from the plant.

Based on the absence of notable cumulative noise sources in the Morro Bay area, which would be additive to MBPP noise, cumulative impacts for the Project are not considered significant.

6.12.2.4 Project Design Features

As discussed above, the Project will not generate any significant noise impacts. In addition to the fact that the Project consists of new combined cycle units that are state-of-the-art and that has inherently low noise levels (compared to the older power plant that it is replacing), special Project noise control design features will be incorporated into the design to ensure avoiding significant noise impacts. The special design features for controlling the noise from the Project are summarized as follows:

- Selecting an effective plant layout for noise control concerns.
- Low-noise Main Transformers.
- Extensive Baffles on the HRSG Exhaust Ducts.
- A Shroud Enclosure around the transition between the GTG Exhaust Duct and the HRSG Inlet.

- Noise control wall plate design on the HRSG Casing Walls.
- Low-noise Steam System Vents, Tanks, and Piping on the HRSG penthouse.
- Low-noise Boiler Feedwater Pump Trains (low-noise motors and noise control blanketing on the pumps).
- Enclosing as much noisy equipment as practical within the Turbine Buildings.
- Acoustical properties on all GTG and STG Turbine Building elements (above and beyond a typical industrial building for this climate zone), including acoustical wall panel construction, ventilation silencers, noise control doors, and quiet HVAC equipment.
- Keeping the existing tank containment berms as sound barriers.
- Adding a 20-foot sound wall along the northern most boundary of the site area (just above Fisherman's Storage area).

6.12.3 DESIGN FEATURES

The Project will meet the City of Morro Bay Noise Element standards as well as the Commission's significant impact threshold, via the project design features delineated above. Consequently, no mitigation measures are expected to be required. However, to confirm that noise impacts remain insignificant, the following noise reduction and monitoring program is included for the Project.

Noise-1

A noise survey shall be performed within 90 days of commercial operations to confirm that the modeled noise levels are met. Any deficiencies shall be noted, and a schedule to correct them shall be developed. A copy of the report shall be provided to the Commission and the City of Morro Bay, which shall be kept apprised of progress made toward correcting any noise-related issues.

Noise-2

Construction equipment, fixed or mobile shall be equipped with properly operating and maintained muffler exhaust systems. Construction noise can be further minimized by concentrating operations to daytime hours. Only low-noise operations shall be conducted in the relatively short duration night-shift construction schedule.

Noise-3

To minimize construction-related truck traffic noise, stockpiling and vehicle staging areas should be located at least 200 feet away from occupied residential dwellings or other sensitive receptor locations to reduce annoyances from vehicular traffic. Construction routes shall be established to

minimize truck movements near residential streets. In addition, vehicle speeds shall be limited to 15 miles per hour on-site and 25 miles per hour off-site in sensitive receptor areas.

Noise-4

Temporary silencers on air and steam discharge vents shall be used during the Commissioning and Initial Start-up Phase. This will reduce noise from the few weeks of air and steam blow cleaning that only occurs during this part of the plant's life cycle.

6.12.4 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

There are no significant unavoidable adverse noise impacts from the construction or operations of the Project.

6.12.5 LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS) COMPLIANCE

A summary of applicable LORS pertaining to noise is provided in Sections 6.12.2.2 and 7.5.12. Construction, operation and maintenance of the Project and modernization activities will occur entirely within the Morro Bay city limits and will be in compliance with applicable LORS pertaining to City noise requirements. The Project will also comply with the Commission noise requirement regarding increases in noise levels to sensitive receptors.

6.12.6 REFERENCES (FOR BOTH MAIN TEXT AND TECHNICAL ATTACHMENTS)

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